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THE MAGAZINE FOR INFORMATION EXECUTIVES

OCTOBER 15, 1994

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COVER STORY

ROI's Altered Stats

New Ways
To Value
A Finite
Resource

ALSO INSIDE
Part One:
**The Consultant,
The Client
And The Imperfect
World**

Kaiser Permanente Foundation
Health Plan's Robert Stallings



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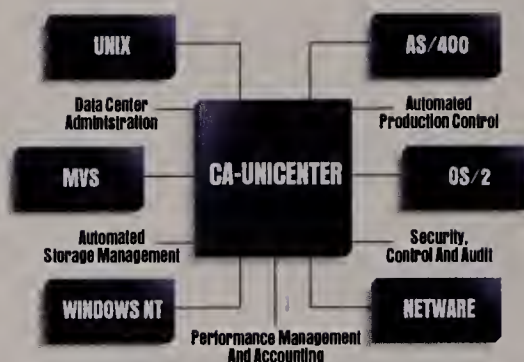
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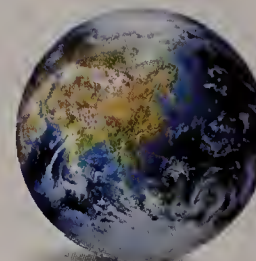


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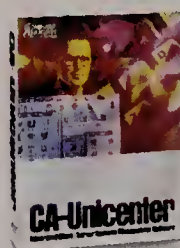


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CIO

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COVER STORY

I.T. METRICS

40

Altered Stats

Revised—and rosier—thinking on the productivity payoff from technology investment may have knocked some of the steam out of the campaign for strict-ROI justification. But the struggle to come up with more-meaningful metrics marches on. *By E.B. Baatz*

Measure for measure 40
Cover photo by Katherine Lambert

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REENGINEERING

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No Guarantees

Hampered by inadequate IS support and facing some alarming changes in federal policy, student-loan guarantor American Student Assistance Corp. undertook an ambitious—and perilous—project to reinvent itself. This is the first in a series of occasional articles.

By Leigh Buchanan

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Titanic 30*

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All for One

Rather than offering one standard product for all consumers, some companies are using mass customization to give individual customers exactly what they want—at a reasonable price. *By Anne Stuart*

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*No guts,
no glory*
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INSIGHTS: CAPTAINS COURAGEOUS

When charting a course through the seas of reengineering, the most important requirement is courage.

By Mark Klein

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STATE OF THE ART: GROW WITH THE FLOW

Workflow software is diversifying from its image-processing base to encompass tools for analyzing business processes and for tracking and sharing all kinds of information.

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CIO LIGHT: MY FIRST BUSINESS BOOK

Stop the presses! Toss out those old management tomes. You're about to be introduced to the one true word in business-management thought.

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Investment in information technology is being viewed in a new light these days as top management finally begins to focus on the business value of IT rather than strict return-on-investment formulas.

In the past, the payback derived from information technology was seen as questionable and boiled down to the catch phrase, the "productivity paradox." Investment in IT was deemed necessary, but the value was difficult to capture in numerical terms, the tried-and-true and most important test for most businesses.

Well, times are changing. Recently, Stephen S. Roach, co-director of global economic analysis at Morgan Stanley & Co. Inc., and the gang at MIT's Sloan School of Management have softened their hard-nosed productivity-paradox condemnations and begun to view investment in IT as producing value. They now realize that return on investment from IT has often been measured incorrectly.

In her eye-opening article, "Altered Stats," which begins on Page 40, Senior Writer E.B. Baatz examines the metrics of IT and reports that many executives are beginning to assess the value of information technology in new and exciting ways.

An important consideration in calculating the business value of IT is the fact that information management is becoming much more pervasive within the organization. Users throughout the enterprise—not just the information systems department—are responsible for the success of IT implementation. Functional departments must assess the competitive impact and organizational risk of technology investments. In fact, the outcome of IT investment is now seen as a measure of management effectiveness.

For years, top managers have chided CIOs for not coming up with better ways of calculating the return on the mind-boggling dollars spent on information technology. Now it's clear that new measures are on the horizon. However, more than ever, information executives must view the implementation of systems as part of business effectiveness. And, they must encourage the enterprisewide perspective that investment in IT is everybody's business.

Marcia Blumenthal



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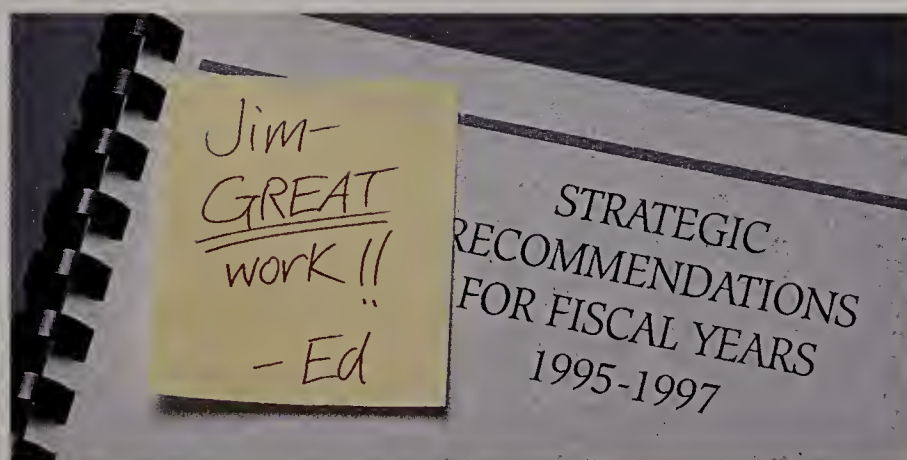
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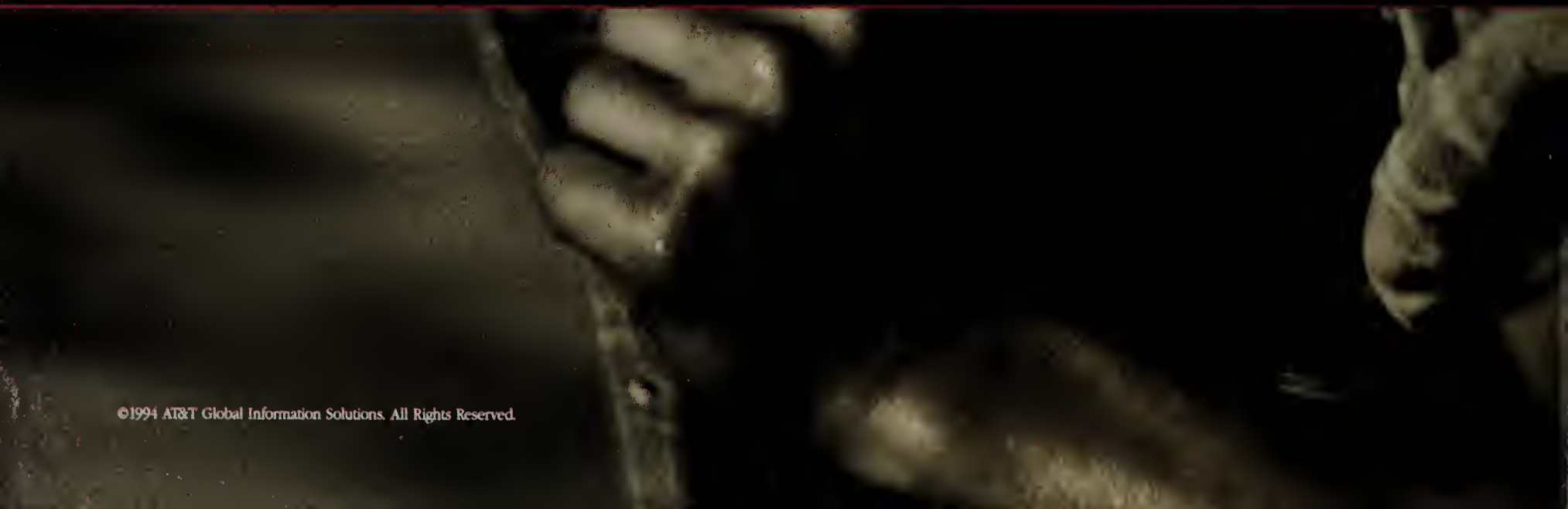
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Jim Bessen, "Riding the Marketing Information Wave" *Harvard Business Review* September-October 1993

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The methods used to measure the return on investment from information technology are evolving. Traditional financial metrics, which had their genesis in the manufacturing-based 1920s and '30s, are being replaced with new models more suited to the knowledge-based 1990s. As executives struggle to define the business value of IT, the focus in ROI measurement is shifting away from the relationship between IT investment and revenue and productivity gains, and toward broader metrics that assess management effectiveness and customer service.

Playing a key part in this new-age way of thinking is a theory New York consulting firm Stern Stewart & Co. has dubbed "economic value added," defined as revenue minus all costs. Another breaking trend in IT metrics is the "real options theory." Based upon the work of Boston University Professor John Henderson, the theory allows managers to explicitly model risk and uncertain payoffs.

How can IT executives stay on top of these and other important trends in ROI measurement? How can they incorporate new-age thinking into their organizations' IT planning and investment process? Senior Writer E.B. Baatz's article, "Altered Stats," beginning on Page 40, is certainly a good place to start. It provides a summary of new strategies and resources to which executives can turn for more information.

In addition, we encourage you to learn more about *CIO*'s ROI*IT Executive Retreat, an educational forum that focuses exclusively on best practices in ROI measurement. It will be held Jan. 22-24, 1995, at the Arizona Biltmore in Phoenix. For more information, please refer to our ad on Page 69 or call us at 800 355-0246.

Stephen L. Levy

Coming In CIO

Stop the Presses!

Futurists and publishers agree on one thing: The publishing industry is rocketing toward a technological revolution as profound as the invention of the printing press. But they have widely disparate views of exactly what shape those changes will take. Meanwhile, managers are gearing up for changes in everything from job titles to revenue sources to how they gather and package the day's news.

On the Job

The CIO career path has been in a state of flux since the term was coined. In a special report, *CIO* will examine the position as it wends its way down its twisty evolutionary path. We will report on where the CIO career is today and where it's heading, ask CIO recruiters to reveal the qualifications most sought in a CIO, and present CEOs and recruiters with the resumes of four fictional candidates to see who they prefer.

Driving IT

When the Massachusetts Highway Department began seeking bids for the construction of a new eight- to 10-lane highway through the center of Boston, it stated one condition: Normal patterns of traffic or structure use must not be disturbed. It found some contractors willing to pioneer new construction techniques, but the project's historic contribution could well lie in another dimension of innovation altogether: the most flexible, powerful and densely linked information environment to emerge in civil-engineering IS.

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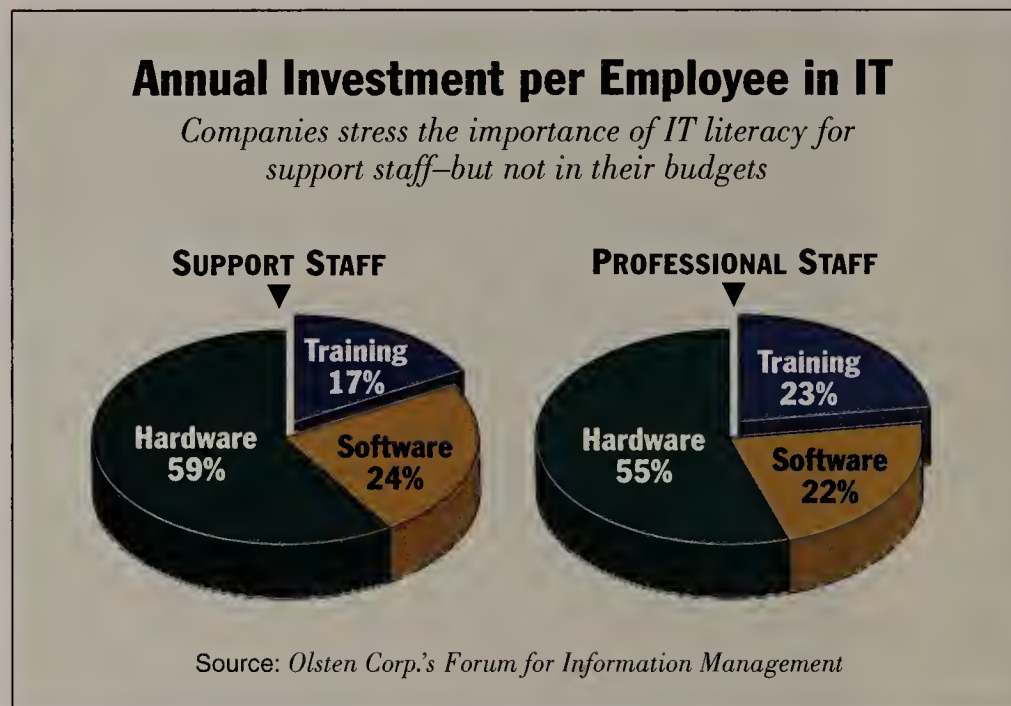
COMPUTER LITERACY

WHY JOHNNY CAN'T COMPUTE

Computer literacy is rapidly becoming as crucial to thriving organizations as just plain literacy is to thriving cultures. Yet, while the need for an IT-skilled workforce has reached critical mass, companies are not increasing—and some are even decreasing—their emphasis on getting employees up to speed at the desktop.

That's the conclusion drawn in a recent study by Olsten Corp.'s Forum for Information Management. Olsten, a temporary-services company based in Melville, N.Y., surveyed more than 1,000 IS executives in the United States and Canada about their companies' computer-use and training strategies. The forum discovered a striking disparity between the importance companies place on computerization—more than 75 percent of respondents hailed IT for improving staff productivity, accuracy and responsiveness to customers—and their willingness to invest money and effort in training.

There were few voices of dissent on the importance of computer literacy. Most respondents agreed that within the next three years, almost all positions—from the



lowest clerical worker up to the CEO—will require computer skills. And most admit they are not prepared to meet that challenge: Only 22 percent rated their employees' computer literacy as being "highly acceptable." Yet instructor-led, hands-on

training seminars, workshops and outside courses were actually being scaled back across the sample. And while companies offering comprehensive instructor-led training—either in-house or through a vendor—are more likely to see a

payback, employers still think it is better to bring in technologies that are simpler to use than to upgrade computer skills.

That's not to say that companies have abandoned computer training; many are just taking a less-intensive approach. Self-guided training software and training

provided by a consultant or a service firm have risen in popularity. And more than two-thirds of respondents said that the best way to increase computer literacy is to provide employees with the means to train themselves at their own pace. Yet

RUNAWAY TRAINING

If everyone thinks computer training is such a hot idea, how come companies are investing so little in it? (See "Why Johnny Can't Compute," this page.) One reason may be that administering training programs—computer and otherwise—can be a hell of a job. That's particularly true for corporations with multiple programs and 5,000-plus employees.

General Motors' continuing-education program, for example, handles enrollment, registration and tuition reimbursement for more than 70,000 workers. In the past, the program was administered from 146 GM sites worldwide—a huge and expensive undertaking. Now GM has centralized that responsibility in one external vendor—Edcor Data Services Inc. of

Farmington Hills, Mich. Edcor, which provides a similar service for the other two-thirds of the big three automakers, is one of several companies that enable organizations to offload training concerns from overworked human-resources staff.

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Application developers who have moved to graphical development tools are learning a painful lesson: while prototyping is fast and easy, it's another thing to try to deploy enterprise applications.

Sure, applications built using the first generation of graphical client/server tools *look* great. But ultimately, they don't have the power to scale up to enterprisewide client/server solutions.

TRENDLINES

again a discrepancy emerges between word and deed: Less than a third of the companies surveyed provide an environment where employees can hone their skills.

Another blow to training: Companies are apparently reducing efforts to evaluate their employees' computer-literacy skills. While companies that systematically test

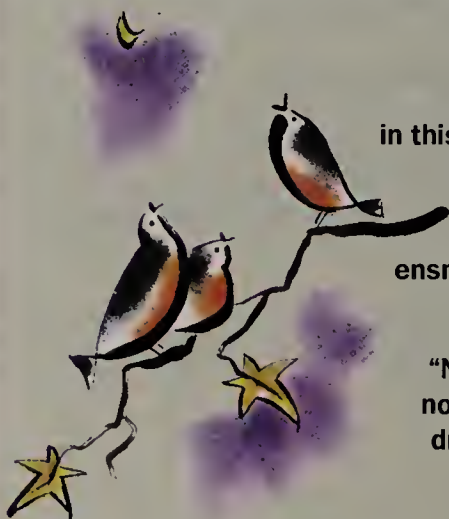
and evaluate those capabilities end up with the most skilled workforces, companies are nonetheless reducing efforts in that direction. The most common evaluative method is still pre-screening job applicants, but even that practice has fallen off significantly in the last year. For information, call 516 832-8200. ■

NO RHYME OR REASON

Not long ago we were eyeballing the new-books list from Addison-Wesley publishers when we noticed a little item called *101 Corporate Haiku* in amongst the tomes on reengineering and new-order management techniques. Intrigued, we tried to look it up in the catalog; not finding it, we assumed it was a prank by some puckish editorial assistant. But when we called to congratulate the company on its refreshing sense of humor we were informed that yes, *101 Corporate Haiku* is a real book; it was announced too late to get it into the catalog; and would we like a copy?

Well, sure.

The poems were composed by corporate consultant William Warriner, whose apparent intention was to refresh and amuse. Surprisingly, we have found them to be great productivity enhancers. Just try E-mailing selections to your colleagues several times a day and we guarantee no one will talk to you anymore. Some random samples:



"So many birdsongs
in this conference, each sings
its own agenda."

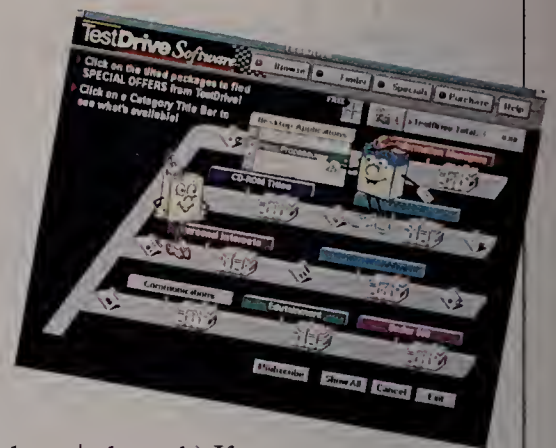
"Sunset is never
ensnared in a choice between
cost and quality."

"No moon and no rhyme,
no reason, no blossoms, I
drink my chardonnay."

ROOM TO EXPERIMENT

Software isn't all that different from cars and shoes: If you don't try before you buy, you're risking something nasty—be it bunions, breakdowns or bugs. With its new Super Store CD-ROM, TestDrive Corp., of Santa Clara, Calif., is offering customers a chance to take some Windows products out for a spin.

Super Store is set up like an electronic version of your local CompUSA—users insert a disk and then browse the aisles, clicking on packages to locate current "specials." Customers can experiment with fully functional programs and obtain related product information, such as reviews, awards and data sheets. (For obvious reasons, only three to five trials of a given program are al-



lowed.) If users like something, it goes into an "electronic shopping cart" that can be unlocked with a code supplied by TestDrive. That provides immediate access to the program from the CD-ROM; a complete shrink-wrapped package with documentation and diskettes arrives shortly thereafter. The company says pricing is comparable to or lower than that offered by mail-order suppliers.

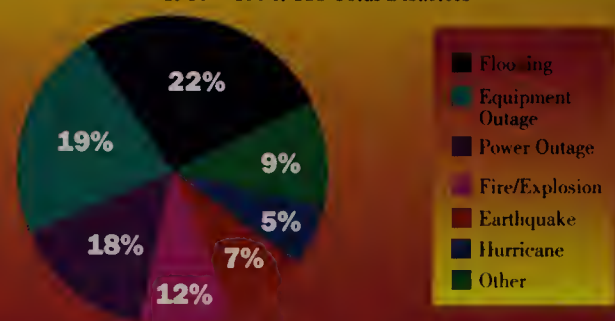
TestDrive Super Store is available directly from the company, at retail outlets and from CompuServe (address: GO TESTDRIVE). Call 800 788-8055. ■

BUILD YOUR ARK: THEN CALL US

IS executives who have nightmares about computer shutdowns should seek work on high ground: Floods are the number-one disaster threatening their crown jewels. That's according to Comdisco Disaster Recovery Services Inc., of Rosemont, Ill., which came up with the data after analyzing 185 disasters it has been involved in since 1980. Also taking a heavy toll were equipment and power outages: plagues of locusts didn't make the list. ■

Types of Disasters Requiring Computer System Recovery Services

1980 - 1994: 185 Total Disasters*



*Numbers include those disasters involving Comdisco Disaster Recovery Services.

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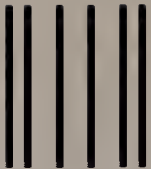
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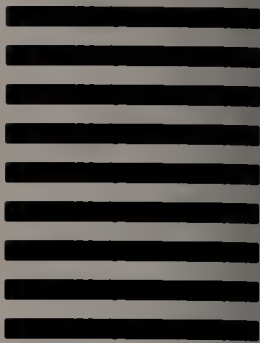


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COMPUTER SALES

THE DIRECT APPROACH

OK, so you can't switch on the Home Shopping Network and watch one of its natty pitchfolk describe the merits of an AS/400. But as many vendors turn their attention from the proliferation of products to the proliferation of sales channels, IS departments are increasingly buying workstations, mid-range computers and even mainframes from sources they once considered only for lower-end products.

One of the fastest growing of these channels is direct marketing, long considered a lucrative vehicle for PC sales. Industry experts project that direct marketing of computers will reach \$8.75 billion by next year, with 50 percent of buyers in all categories except local area networks shopping through this channel. And while many of the first-tier PC vendors are moving away from direct marketing—largely because of conflicts with other channels—increasingly sellers of mid-range products are adopting it.

"Direct marketing is gaining strength in the mid-range market because surveys have found that the corporate buyers—the AS/400 buyers, the RS/6000 buyers, the buyers of Sun software and peripherals—have a higher comfort level buying products through this channel," says Dorothy Rosenthal, manager for distribution channels at market-research firm International Data Corp. in Mountain

View, Calif., which is owned by CIO's parent firm. These buyers are experiencing such benefits as quick delivery, volume discounts and the convenience of not having to deal with a sales rep. "If you've got a large bank that already has 60 RS/6000s and they want 10 more, why do they have to call a salesman?" asks Rosenthal. "It simplifies the process for products that companies are

already used to using."

Digital Equipment Corp., the granddaddy of the technique, has been selling VAXs, workstations and PCs through catalogs for more than 15 years: Currently, more than 20 percent of the company's U.S. revenue is generated from that channel. Hewlett-Packard Co. is also getting into the act, although Rosenthal says that it—and many other ven-



dors—has been held back by fear of retribution from other channels. No such fear is apparent at IBM, however. Big Blue is pitching AS/400s, RS/6000s, workstations and mainframes in several catalogs. "IBM is saying, 'Look, we are so interested in economies of scale and the cost of sales coming down that we are willing to irritate our VARs,'" says Rosenthal.

At Sun Microsystems Inc., the fastest-growing division is SunExpress, a Chelmsford, Mass.-based direct-marketing subsidiary. SunExpress has been adding new customers at the rate of 3,000 a quarter; last year, it mailed 750,000 catalogs and 600,000 direct-mail pieces, and made and received more than 400,000 calls. The company offers an extensive selection of SPARC and Solaris aftermarket products, as well as Sun-compatible products from other manufacturers. ■

CAREER MOVES

Anheuser-Busch Co. Inc. has appointed **ROBERT W. MASON** vice president and CIO. His most recent position was that of manager, information systems operation, at GE Lighting Products Division.

EUGENE RADETSKY was recently named vice president and CIO at the New York City Transit Authority's Information Services Division. Radetsky will manage the transition to a client/server-computing environment.

Trinzic Corp. recently appointed **FREDERICK W. ROOK** to the position of chief technology officer. Rook was most recently employed at Price Waterhouse as leader of the Advanced Computing Technologies Practice.

Decision Data Service Inc. of Horsham, Pa., has named **STEVAN SIMICH** its new CIO. He will be involved in completing the integration of the company's nationwide data-processing network. ■

SURVEYS, SURVEYS, SURVEYS

A day without receiving a study on client/server computing is like a day without...well, frankly, we can't remember the last time we had a day without receiving a study on client/server computing. Here are the highlights from several that recently crossed our figurative transom.

Business Research Group (BRG) surveyed 414 IS decision makers at medium-size companies and found that 37 percent have implemented



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client/server computing and 15 percent plan to within two years. BRG predicted an additional boost for client/server based on the fact that 41 percent of respondents said their current mainframe/mini systems are at least five years old.

Input consultants, meanwhile, are also predicting the continued burgeoning of client/server. The company projects that the U.S. client/server-software market will grow 29 percent annually from a base of \$14 billion in 1993. Of the 2,000 companies Input surveyed, 27 percent indicated that they expect to move to client/server systems, with particularly heavy interest from the health-care, telecommunications and wholesale trade industries.

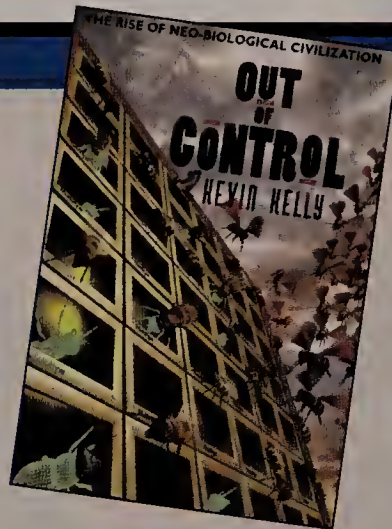
Finally, the gang over at Forrester Research Inc. interviewed 75 Fortune 1000 firms and found that 65 percent had implemented client/server systems (that's up from 14 percent in 1990). An additional 27 percent of companies reported that they are in the investigative/pilot phase, and only 8 percent are not experimenting with client/server at all.

We'll keep you posted. ■

OFF THE SHELF

OUT OF CONTROL: THE RISE OF NEOBIOLOGICAL CIVILIZATION

By Kevin Kelly
Addison-Wesley
(Reading, Mass.), 1994
522 pages, \$28



What Kevin Kelly calls the “born” and the “made” are mating, creating a muttlike intermingling of biologic and technologic life. Lest one be tempted to think of Darth Vader and that other angry leftover brain mass, RoboCop, Kelly’s vision of this intermingling is a lot more challenging and provocative and has the added virtue of being factual (or at least, in some cases, imminently so).

Kelly’s book, *Out of Control: The Rise of Neo-Biological Civilization*, chronicles disparate examples of these bidirectional transferences of born and made properties into one another. Kelly, executive editor of the techno-pop magazine *Wired* and formerly editor of the neo-hippie *Whole Earth Review* is a writer up to the metaphorical task of exploring dense ambiguities. In an elegant setting of the scene and theme, he describes an incident from his hobby as a beekeeper when he chain-sawed through a dead tupelo tree and discovered, sheltering in its hollows, an enormous mass of bees: “The insects filled a cavity as large as I was. It was a gray, cool autumn day and all the bees were home, now agitated by the

surgery. I finally plunged my hand into the mess of comb. Hot! Ninety-five degrees at least. Overcrowded with 100,000 cold-blooded bees, the hive had become a warm-blooded organism. The heated honey ran like thin, warm blood. My gut felt like I had reached my hand into a dying animal.”

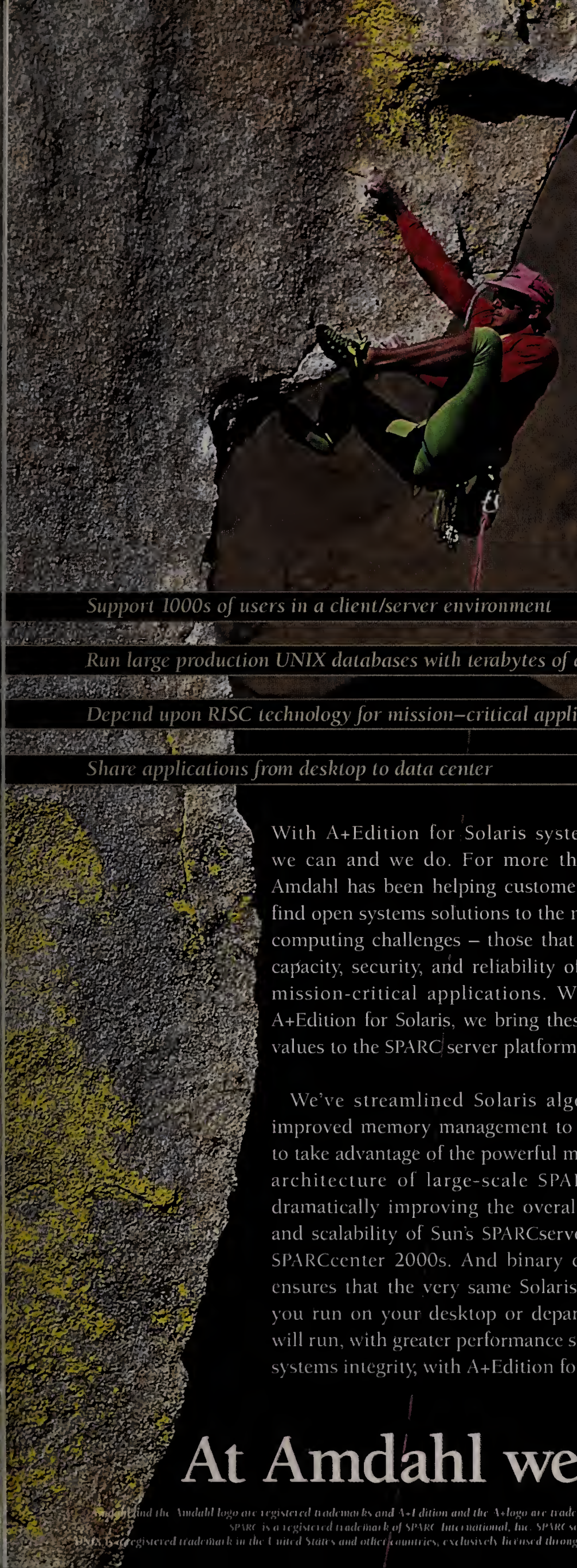
Kelly’s work with bees was a fitting apprenticeship to the insights he pursues in *Out of Control*. From the superorganisms of hive life derive some of the best models for systems behavior and structure drawn upon by computer scientists (consider parallel processing) and network designers. And while the commercial objectives of artificial intelligence are sometimes seen as having foundered badly on the rocks of human-brain emulation, the study of brains—and especially their finely compartmentalized distribution of memory—has provided rich inspiration for AI pioneers.

Kelly relies on the idea of coevolution—the reciprocal adaptations of interacting species over time—to define a climate for the intermingling of all life forms: the organic and everything else. What, for ex-

ample, are the burgeoning “virtual” online communities if not a collaboration between human and technological spirit, combining to create what Kelly calls “hive mind”? The cyberspace network equals an infrastructure—a hive—plus everything within it. Fundamentally, it is both a place and a living creature; and the hive is beginning to exert a coevolutionary force upon its growing legions of beelike denizens.

Besides cyberspace, Kelly ponders such relatively “tame” bio/technological phenomena as virtual reality and simulation technologies. He also explores the extremely weird implications of the increasingly widespread access by common folks to sophisticated cryptographic technologies. We face, posits Kelly source Tim May, a future of “crypto anarchy,” the end of all secrets—since they can’t be kept—and the consequent growing meaninglessness of borders and boundaries of any kind. (“One thing for sure,” Kelly quotes May as promising, “long-term, this stuff nukes tax collection.”)

Kelly lays out the various neo-biological futures with a cool reportorial detachment that is occasionally exasperating. About some of the more extreme courses he describes, one wants either a forthright endorsement or an unpulled punch of revulsion. Instead, Kelly’s mildly ambivalent oscillations may lead readers to wonder what he really thinks about some of this stuff. ■



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Captains Courageous

When charting a course through the seas of reengineering, the most important requirement is courage

BY MARK KLEIN

Reengineering has become the watchword for organizations seeking breakthrough improvements in performance. Companies both large and small, in all industries, have begun experimenting with business-process reengineering—also known as process redesign or process innovation—as a means of transforming themselves into leaner, more nimble and flexible competitors.

Yet for all the publicity, the truth is that a substantial majority of the reengineering projects undertaken so far have either failed outright or fallen far short of their original objectives. The factors associated with reengineering success have been well documented: top-management sponsorship and support; solid understanding of reengineering principles; ambitious, clearly communicated goals; concurrent exploitation of informational, technical and social enablers; and careful management of change. But even in reengineering projects where all of these factors exist, real success is often elusive. The one ingredient that makes the difference is courage.

Most successful re-

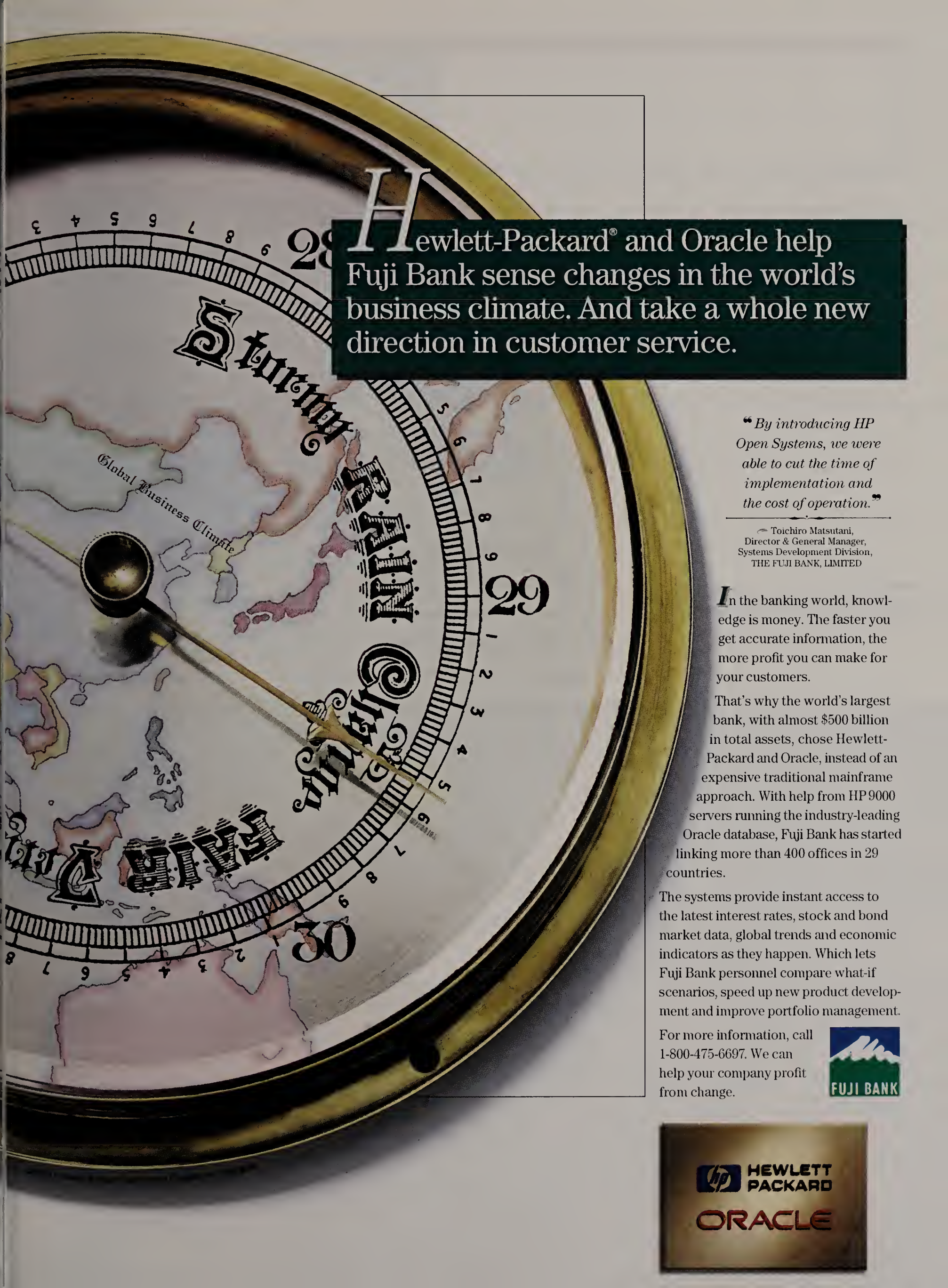
engineering models utilize a senior-management sponsor and a reengineering team. Both require courage. The sponsor's role in a reengineering project is to select the team's members, give them the parameters of the project (business objectives, project goals and scope, expectations for time, cost, risk and social disruption), and provide emotional and political support as well as the necessary resources. Generally, the sponsor will be the senior-most manager responsible for the area of the business that is to be reengineered. If the project scope is larger than the scope of the sponsor's responsibility and authority, it is unlikely the project will succeed.

Courage is required of the sponsor in several areas:

Choosing the team. The sponsor must select the best people for the reengineering team, not the people who happen to be available. The best people for the team are those who are bright, intellectually curious, nonpolitical, capable of thinking and seeing beyond their functions and disciplines, and respected within the organization. Usually, these people have significant management responsibilities and are in demand for many projects. In short, they are often those the organization can least spare for the reengineering team. So, the sponsor must have the courage to shield team members from conflicting demands (sometimes from their bosses).

Allowing the team to structure the project. In most cases, reengineering replaces top-down, command-and-control organizations with empowered organizations; that is, it replaces high-conformance organizations with high-commitment organizations. But one can't expect a reengineering team to design such an organization if the team itself is





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organized under the old paradigm. The sponsor must, therefore, give the reengineering team the freedom to find the style that works best for that group.

Resisting the urge to lead. The team should select its own leadership and treat the sponsor as a client.

Listening to the team without being defensive. Since the sponsor is usually responsible for the area being studied by the team, there is a natural tendency to see any criticism of the area's performance as a criticism of his or her management of the area. Instead, the sponsor should view the team's candor as an opportunity, not an attack. Like a father asking his teenagers what they think of him, the sponsor must summon the courage to listen with an open mind.

This does not mean that the sponsor should accept the team's findings and recommendations uncritically. He should challenge, question and probe until he is convinced that the team's work is solid. And then he should have the courage to fight for adoption of the reengineering vision.

Members of the reengineering team—those who actually carry out the reengineering project—need courage as well:

Accepting the assignment. Reengineering projects tend to have high visibility and high expectations, so the opportunity for a career "win" is also an opportunity for a "loss." In addition, reengineering projects are a lot of hard work; because team members usually remain responsible for their regular jobs throughout the project, reengineering often means putting in long days, weeks and months.

Rethinking the business. Reengineering teams frequently spend their first few days debating whether the sponsor really means what she said, whether the organization is really open to radical change and whether their ideas will really be heard. Some teams never get beyond this point and try to craft messages that they believe their sponsors want to hear. Fortunately, most

teams conclude that the only way to find out if the sponsor is sincere is to take her at her word.

Calling it as they see it. Business processes in most companies today are a product of historical evolution. They reflect the errors, inhibitions, prejudices and assumptions of generations of managers and managed. Hence, they often enshrine archaic policies, procedures and practices, some of which made sense at one time and some of which never made any sense.

Similarly, many business processes simply fail to exploit all that we have learned—about the cost and ca-

**The best people for
the reengineering team
are often those the
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have the courage to shield
team members from
conflicting demands.**

pabilities of technology, the power of information and human potential—since they took form. These processes continue to exist not because managers are stupid, wrong-headed or lazy but because they are busy or have lacked the tools to deal with the problem. Nevertheless, when the reengineering team examines current processes in detail, some of the inefficiencies and dysfunctions are so blatant that team members frequently ask, "Why have we allowed this to happen?" But this question is self-defeating because it begs the question, "Who is to blame?"

Even if such nonproductive questions are unvoiced, they are rarely unthought, causing team members to be timid and overly sensitive to the sensibilities of current process managers. It is far better for the

team to view problems as opportunities and to focus on the question, "How can we make things better?" Yet it takes real courage to ignore who is responsible for the current work and speak frankly about the problems.

Benchmarking. Benchmarking is often used in reengineering to identify better ways to accomplish the work of a process. In benchmarking, team members seek out other organizations that appear to be outperforming their own and study how they work. Courage is required to accept the idea that someone else may do it better and to suppress the urge to say, "Well, that might work for them, but it would never work for us."

Envisioning change. Courage is required to envision a breakthrough process that will improve performance dramatically and to "sell" that vision to the sponsor and the rest of the organization. The vision may be informed and enabled by knowledge of the current process, the achievements of others and the capabilities of technology and human potential. Yet the team won't know at the outset how to achieve the vision (that comes later, during process design), only what it wants the process to do.

Committing to the attainment of a vision without certainty that it can be achieved is perhaps the most courageous act of all. But it is this act that ultimately allows reengineering to succeed. As Johann Wolfgang von Goethe wrote:

Are you in earnest?

Seize this very minute—

What you can do,

or dream you can, begin it,

Boldness has genius,

power and magic in it.

Only engage, and then

the mind grows heated—

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will be completed.

Mark Klein is executive vice president of New York-based Gateway Management Consulting, which specializes in enabling business transformation through reengineering training, facilitation and consulting.

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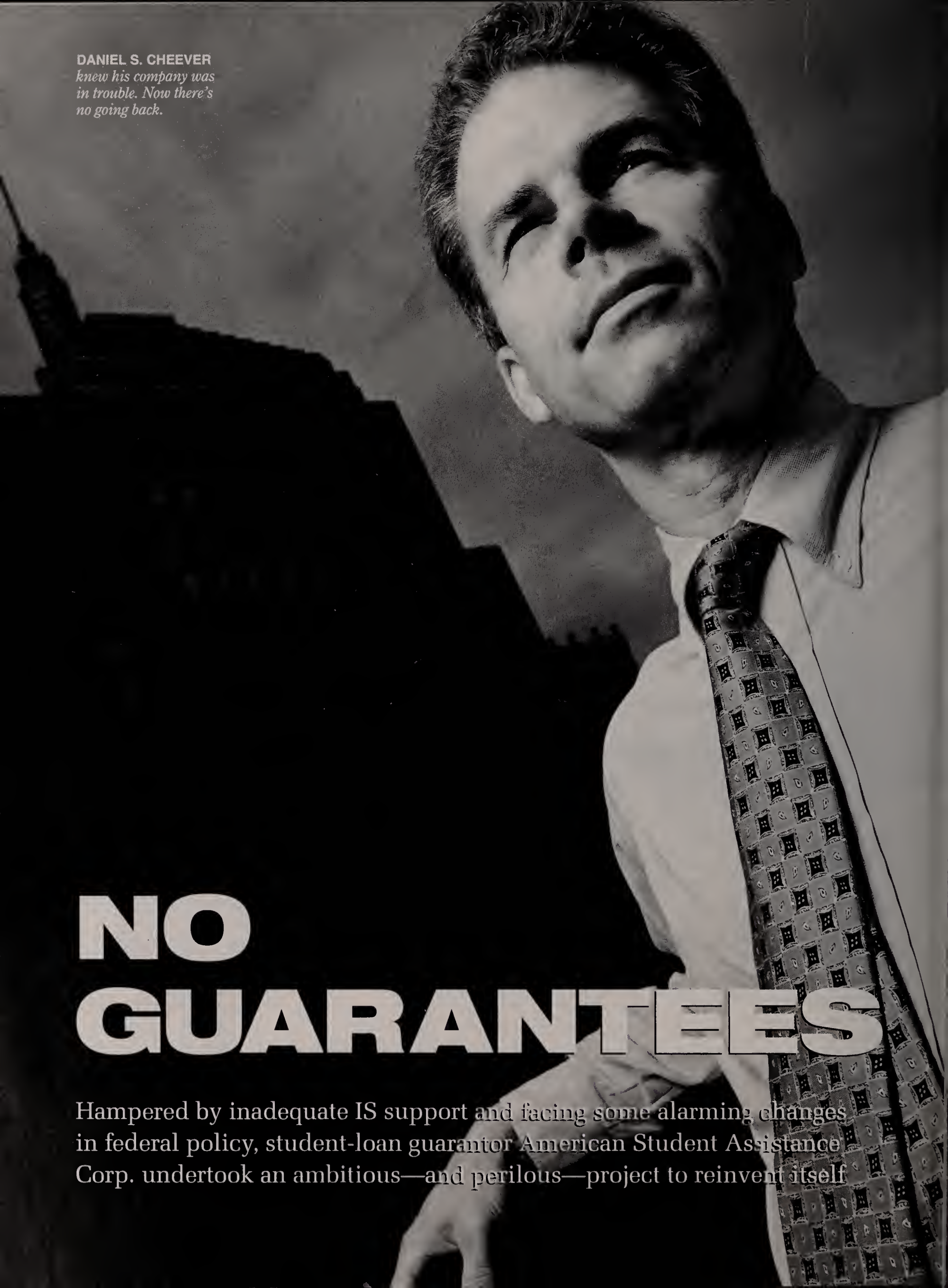
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DANIEL S. CHEEVER
*knew his company was
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NO GUARANTEES

Hampered by inadequate IS support and facing some alarming changes in federal policy, student-loan guarantor American Student Assistance Corp. undertook an ambitious—and perilous—project to reinvent itself

BY LEIGH BUCHANAN

COMPANY PROFILE

American Student Assistance Corp.

(ASA) is a nonprofit organization with 1993 revenues of \$26.6 million.

The nation's first guaranty agency, ASA works with schools and private lenders—including banks and credit unions—to make low-interest loans available to eligible students. ASA ensures that lenders participate by providing a guaranty on each loan. In the event of a default, ASA reimburses the lender and is in turn reimbursed by the federal government. In addition, ASA administers the loan-application process, provides training and technical assistance to schools and lenders, enforces compliance with federal laws and recovers defaulted loans. ASA administers about 225,000 loans a year totaling \$860 million. The company has approximately 340 employees, about 75 percent of whom will be regular users of the new system.

DANIEL S. CHEEVER FELT like he had been run over by a truck. The president of American Student Assistance Corp. (ASA) sat in a conference room, arms folded protectively across his chest, while the consultant he had hired to help evaluate ASA's future patiently explained why the company didn't have one.

It was October 1993, and the Boston-based student-loan guarantor had just weathered the most disastrous processing season in its 35-year history. ASA's customers were complaining loudly about errors and delays: disclosure statements printed incorrectly, new federal programs implemented late, loan-processing tapes mislabeled and sent to the wrong schools. At least one college was making noise about finding a new guarantor, and Cheever feared others would follow. "It was like a DMZ in Vietnam," he says. "It was awful."

While Cheever didn't know much about information systems, he knew that inadequate IS support was hurting his company. When the former college president had joined ASA two years earlier, he had initially blamed staff inadequacies for the company's problems. But "over time I began to realize that more and more of our difficulties were related to systems and fewer and fewer of them to people."

At the time, ASA's data processing was provided by Education Loan Services Inc. (ELSI), an affiliated student-loan servicer spun off from ASA in 1983. An IBM Cobol operation, ELSI's processes were ad hoc, its skills below average and its delivery record spotty, says Cheever. The company's data-processing backlog exceeded 300 requests, some dating back as far as three years. Delays were angering customers and jeopardizing ASA's compliance with federal regulations.

Cheever knew service had to improve, and he made that point repeatedly to ELSI's management. He feared that the other company was putting its best people to work on its own projects and giving ASA short shrift. "I would leave those meetings with a stomachache," Cheever says. "They had no idea what was going on. They'd try to do a change to the system, and that would set off other changes and

bad things would happen. You would never know what would happen until it did."

At the same time, changes in federal policies were putting ASA under new financial pressures. The company generates revenues from fees paid at different phases of the guaranty and collection process; the government, which sets those fees, was planning to reduce them. The Clinton administration was starting down the path toward direct federal lending—a move that would, over time, eliminate middlemen like ASA. Those two developments alone would cause ASA's revenues to drop 42 percent over four years, according to the company's projections.

Frustrated and worried, in February 1993 Cheever asked Sara A. Stott, president of ASA's guarantor organization, for a strategic plan. But summer rolled around and the problems only escalated. In June, Cheever told Stott to go out and find someone who could give them some straight answers about what was wrong with the company's systems and how to fix them. The someone Stott found was Philip Pyburn, a Harvard Ph.D. and managing director of the newly formed Tradewinds Information Strategies Inc., a business-technology consultancy in Cambridge, Mass.

The Death Spiral

Cheever's first impression of the consultant was less than reassuring: Pyburn is a voluble, aggressively articulate man, with a penchant for suspenders and colorful ties. "I wondered if there was any substance to him," says Cheever. "My first thought was, 'My god, Sara's hired the Music Man.'" But he kept those thoughts to himself and let the consultant go about his job of trying to understand ASA's business. Pyburn spent more than two months assessing ASA's current IS capabilities and estimating its future systems needs. In October, he made his first presentation to senior management.

Pyburn's analysis went like this: While the guarantor part of the business was making a little money, operations was losing a lot of money and wiping out the company's surplus (ASA is a nonprofit organi-





PHILIP PYBURN: *"Their only hope of surviving was technology."*

zation). The company would lose more money when fees were reduced, forcing it to cut costs. That meant services would suffer and revenues would decline further as clients backed away, forcing more cuts and further deterioration in service. "They were right at the edge of a death spiral," says Pyburn.

For Cheever, it all rang true. "I expected bad news."

According to Pyburn's scenario, ASA could only survive by reducing both fixed and variable costs. That meant changing its technology base, cutting its staff in half and growing the revenues. "They had to change the production function," says Pyburn. "We convinced them that their only hope of surviving

was technology." He offered ASA three choices. One, it could try to improve the existing IS function; that would take five years, and the company only had 18 months to live. Two, it could reengineer the business, but that would take time, too, and still wouldn't solve the problem. Three, it could obliterate everything and start over, with new systems, new people and a new facility—a completely reinvented business.

The consultant's schedule was aggressive: He wanted ASA to reduce operating costs by 20 to 30 percent immediately and by more than 60 percent over the long term. To achieve that, the company would have to make the jump from what Pyburn calls "a

sound development, processing and delivery operation circa 1975" to a state-of-the-art object-oriented client/server environment. His time frame: 12 to 24 months.

Pyburn's vision was certainly enticing. It offered ASA not only a lifeline out of its current difficulties but also the prospect of new business opportunities, including becoming an IT vendor for the industry or a collection agent for other types of loans. The company already had some limited client/server experience. Still, Cheever remained skeptical. Pyburn was estimating that the system would pay for itself within three years, with an ROI of several thousand percent over its lifetime. "The numbers for the alternative seemed too good to be true," says Cheever. "Especially because Phil was going to come in and be the savior."

A Stark Reality Check

At the time Pyburn offered his prognosis, senior management was considering other options as well. The company had flirted with the notion of buying ELSI's IS operations but rapidly dismissed that possibility. (Eventual-

ly, ELSI was acquired by the New England Education Loan Marketing Corp., or Nellie Mae. The Education Resources Institute [TERI] Services Inc., another of ASA's sister companies, took over ELSI's IS division and continues to handle ASA's information processing throughout the migration. See related story, Page 34.)

ASA's internal auditor, Missy Hagemeyer, was evaluating outsourcing to a larger competitor. In December, a senior-management team visited the Pennsylvania Higher Education Assistance Agency (PHEAA), which was in the process of developing a state-of-the-art mainframe loan-servicing system. But the guarantor piece wouldn't be operational until 1996—and, besides, Cheever doubted whether schools that converted to the PHEAA system would continue to use ASA as their guarantor.

At the same time, management was experiencing something of an epiphany with regard to its business. ASA had always considered itself a loan guarantor, but in reality it is the government that pays out when a borrower defaults. "What we realized is that we

The company would have to make the jump from what Pyburn calls "a sound development, processing and delivery operation circa 1975" to a state-of-the-art object-oriented client/server environment. His time frame: 12 to 24 months.



SARA A. STOTT
is heading up the migration.

Strained Support Systems

While the delay of ASA's implementation drags on, its IS service provider struggles to keep the business running

ASA's migration to client/server systems and an in-house IS staff means that The Educational Resources Institute (TERI) Services Inc. will be losing its largest customer by far. The move has understandably created some hard feelings among TERI Services' management, who must devote much of the company's resources to maintaining ASA during the transition without hope of sharing in its happy ending.

Everyone agrees that things have improved since TERI Services assumed ASA's information processing last year. Judy Hoyt, TERI Services' senior vice president of IS, says the company has spent twice as much on staff to carry out systems modifications as its predecessor did. It has also implemented a formal life-cycle development procedure and moved relations with sister company ASA to a more-businesslike footing.

But as ASA's cutover deadlines have fallen by the wayside, TERI Services has had to struggle to keep the business running. "We had to do a lot of special incenting to keep people until July 1 because once it was announced we had lost the contract, a lot of our best people began to look for work elsewhere," says TERI Services President Tom Parker. "We had to spend a lot of time and money to keep them on board, and that job becomes more and more difficult as the process drags further and further out." Hoyt says that ASA's focus on its new systems—at the expense of the old ones—is also having an adverse affect. And the attention TERI Services has had to devote to ASA has made it difficult to develop the new services and clients it will need to survive.

Finally, while TERI Services does not dispute that computer problems contributed to ASA's difficulties, Hoyt and Parker say that the systems have come in for more than their fair share of blame. "Anytime there's a computer-based problem..., I will always say the computer is 50 percent responsible," says Hoyt. "But systems are dumb machines. They do what they're told."

—L. Buchanan

are actually a data-processing operation," says Hagemeyer. That meant outsourcing would, in effect, be giving away the business. "It was a stark reality check for everyone." Senior management presented its findings to ASA's board of directors just before Christmas, including both the outsourcing option and Pyburn's recommendations. In January,

Cheever asked Pyburn to create a prototype of the reengineered systems. Cheever presented it to the board in February: The board approved the plan, and June 30 was officially accepted as the deadline for implementation of the guaranty-processing phase.

Off the Titanic

The price tag for the whole project was \$5.9 million, not including the costs of leasing and setting up the temporary development site. Fouad M. Sayess, president of ASA Services Corp., had been studying Pyburn's numbers and was "shocked," Cheever says, when he realized how much Tradewinds stood to make on the deal. He urged Cheever to negotiate a contract whereby ASA would pay Tradewinds only fixed costs while it was building the system. When Pyburn delivered something that worked—and ASA would determine the criteria for what worked—the consultants would receive their profit margin.

Cheever thought these demands might be too much and worried that Pyburn would walk away. "We were off the Titanic in a lifeboat, and now we needed Phil," he says.

Predictably, Pyburn was irritated by the proposal. "The difficulty with these kinds of contracts is that they create a win/lose environment," he explains. "It sows the seeds for contention instead of being a real partnership. What you really want is a team of people—users and developers—to all have the same incentive." Still, after some give and take, the players signed a contract that closely resembled the one proposed by Sayess. The arrangement pleased Cheever: It meant that Pyburn was confident he could produce.

Now that the company had committed itself to radical change, Cheever felt excited, hopeful. Throughout the previous fall, he had been attending breakfasts with his academic clients and speaking frankly about ASA's problems and what was being done to fix them. All had agreed to wait another year and see how things panned out; but with the company essentially on probation, the migration had become a make-or-break issue—and everybody knew it.

A Company in Mourning

Then, in March, the project was touched by tragedy. Three top executives from Marble Associates, the Watertown, Mass., subcontractor Pyburn had hired to handle the actual development, died in a small-plane crash.

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Hagemeier estimated that delays would cost ASA an additional \$1 million in fees that would have to be paid to TERI Services and the cost of staff that could not be eliminated on schedule.

Marble's staff was plunged into mourning. Four of the six people working with ASA left the company (Tradewinds hired two of them back as independent subcontractors), and productivity predictably suffered.

"In any small development company like that, it's the personal power of the founders that keeps the whole thing knit together, so it was very tough," says Stott, who is heading up the migration for ASA. Cheever estimates that the project lost a month; Pyburn thinks it is closer to two. The most damaging factor, according to the consultant, was the loss of the technical project management that Marble had provided. That hole wasn't truly filled until July.

The turmoil at Marble took its toll on ASA's schedule, but it was not the only culprit. By June, the deadline for implementation had been pushed back to July 25. By the middle of July, it was hovering around early to mid-fall. At the time, Hagemeier estimated that delays would cost ASA an additional

\$1 million in fees that would have to be paid to TERI Services and the cost of staff that could not be eliminated on schedule. Pyburn attributes part of the problem to a deadline predicated on a December starting date. Development didn't get underway until February, "so we were behind the eight ball from the start," he says.

As Boston entered an unusually hot summer, Cheever's nervousness rose with the mercury. In June, he mailed Pyburn a *Newsweek* article that took issue with the client/server miracle. "You may have seen [this] caveat emptor about client/server systems," Cheever wrote in an attached note. "I'm sure my board of directors has, and they'll ask me about it at the next meeting. Could you give me a paragraph or two which answers the article's concerns about client servers? I'd need it a day or two before the meeting.

"If there isn't a good answer, could you hold my jacket while I jump off the roof?" **CIO**

MISSY HAGEMEIER:
Outsourcing would, in effect, be giving away the business.



PHOTO BY WEBB CHAPPELL



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ALTERED STATS

Revised—and rosier—thinking on the productivity payoff from technology investment may have knocked some of the steam out of the campaign for strict-ROI justification. But the struggle to come up with more-meaningful metrics marches on.

BY E.B. BAATZ



JOHN CHIAZZA WAS WELL ARMED

for his first meeting with Eastman Kodak Co.'s new chief financial officer. With an arsenal of data, charts and spreadsheets in hand, Chiazza knew that the first question—as it had been in the past—would be about costs. How much was the company spending on information technology relative to revenue? As the director of information systems for Kodak and a

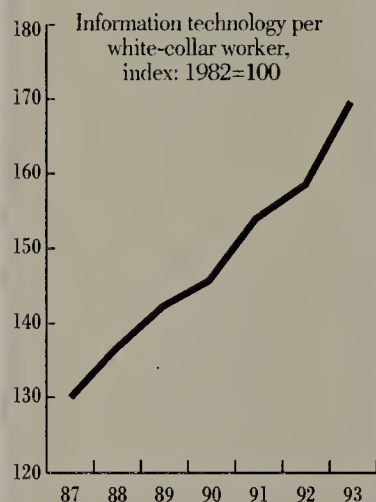
former finance guy himself, Chiazza was accustomed to the battle. If not particularly pleased, he was prepared. But Chiazza was in for a surprise. The first question the CFO fired wasn't about IT-to-revenue ratios. "No, the first thing he asked me was, 'Where are we using information technology to competitive advantage?'" recounts Chiazza. The cost issues came up later, he says, but that first unexpected question revealed that the new leadership at Kodak was bringing a fresh mind-set to the business value of information technology. The IS director could lay down his arms at last.

The days of relying solely on outmoded, traditional financial metrics to monitor the returns on

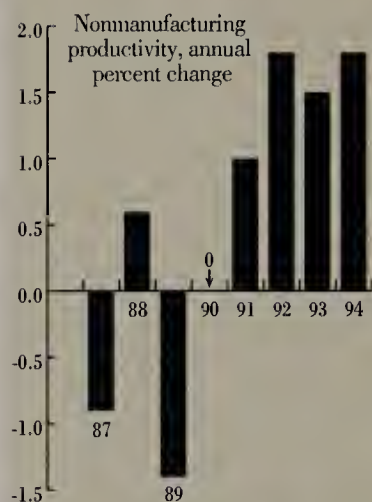
JOHN CHIAZZA: *At Kodak, at least, it may no longer be necessary to fight the strict-ROI fight.*



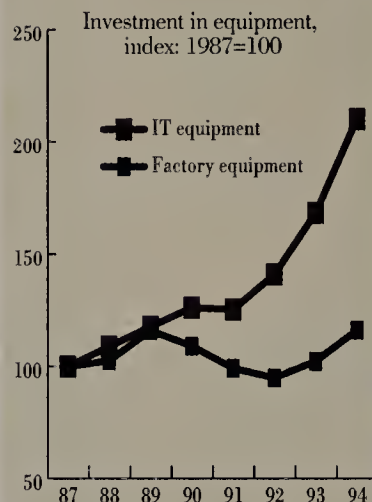
Services IT spending booms...



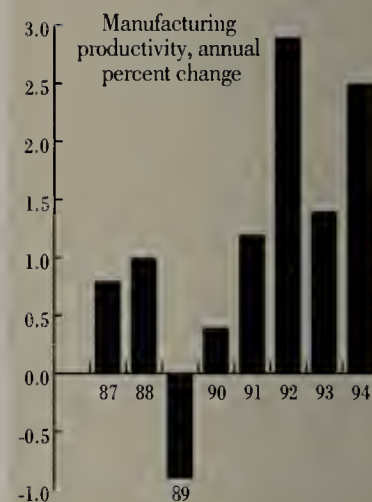
...with little impact until the '90s...



...as manufacturing IT soars...



...with results showing now too.



Note: 1994 estimate based on first quarter data. Source: A. Gary Schilling & Co. Inc. and Morgan Stanley & Co. Inc.

IT investment appear indeed to be on the wane. While the danger of overinvesting or investing unwisely in information technology still concerns business executives, 1994 marks the year the productivity paradox perished. Those dismal scientists, the economists, have been the unexpected harbingers of the good news (see related story).

The problem with the so-called productivity paradox has always been essentially a problem of metrics. In 1988, Harvard University economist Gary Loveman got the paradox bandwagon rolling with his now-infamous macroeconomic study of lackluster productivity returns after nearly a decade of huge IT investments. Stephen S. Roach, principal and co-director of global economic analysis at Morgan Stanley & Co. Inc., chimed in with data that showed a \$750 billion investment in computer hardware had produced negligible results for the service sector in the 1980s.

The publication of Paul Strassmann's 1990 book, *The Business Value of Computers*, drove the point home with countless scatter diagrams illustrating a virtually nonexistent relationship between spending on computers and business profitability.

Strassmann, formerly CIO at Xerox Corp. and the Defense Department, and now an IT economics consultant in New Canaan, Conn., and research fellow at Ernst & Young's

Center for Business Innovation in Boston, concluded with the others that business had invested too much for too little return.

IT practitioners were left with the fallout: the boss demanding more-

rigorous financial analysis of each and every investment.

"Thanks in part to the sheer size of the investments and the associated operational expenses, management began paying more attention to

Bye-Bye Productivity Paradox...

.....
Reports on the dearth of IT impact may have been greatly exaggerated

After all the high anxiety about the productivity paradox, the good news can't be trumpeted loudly enough. Stephen S. Roach, the Morgan Stanley & Co. economist and co-director of global economic analysis who has been arguably the most vocal critic of information technology, says the macroeconomic data for the service sector of the economy is finally signaling returns (see "A Resounding Maybe," *CIO*, Feb. 1, 1994). The data: Productivity in the service sector rose 1.6 percent per year during the

first three years of this decade compared with 0.8 percent productivity growth on average in the decade of the '80s. "That doesn't look like much," says Roach. "But it's a significant change."

In addition, Erik Brynjolfsson, an assistant professor at the MIT Sloan School of Management, reports that returns on investments in computers have been on a par with returns on investments in other equipment (see "Paradox Lost?" *CIO*, May 1, 1994).

The data: In a study of 367 large companies from 1988 to 1992, information technology investments yielded over a 45 percent return on average, after depreciation. Answering the charge that the study was skewed by favorable returns in the manufacturing sector, Brynjolfsson reran his analysis on a subsample of nonmanufacturing companies and found that the returns were the same.

Or perhaps the productivity paradox was all shadowboxing. The National Research Council's study, *Information Technology in the Service Sector: A Twenty-First Century Lever*, released earlier this year, raises se-

IT," says Charles L. Gold, a consultant with the Ernst & Young business innovation center. In the 1980s, the financial officers brought their lingo of return on investment and net present value to the IT investment table, and the number crunching got serious. No one questioned that some investments had been big losers, but IT executives wondered if a too-heavy reliance on ROI was putting their companies irrevocably behind in the race to win competitive advantage through technology.

The lure of big—but often intangible—returns from technology investment sometimes has meant abandoning the chase for IT metrics altogether. Cooper Communities Inc., a privately held developer of retirement communities based in Bella Vista, Ark., is spending a few million

rious questions about the macroeconomic data altogether, particularly in the service sector. Productivity is measured by economists as physical output per unit of input. The government's productivity watchers at the Bureau of Labor Statistics readily admit to the flaws of this approach in today's knowledge-based economy.

The data: Statistics on productivity are not even available for 58 percent of all service workers. Among the remaining 42 percent, for a significant number of industries—notably banking, financial services, education, health care and government—output is imputed solely on the basis of input. By definition, then, the productivity ratio is "one" and a ratio based on unity never changes over time.

All this quirkiness has a way of making economists understandably cranky about the value of the government data. Nonetheless, while the economists continue to argue about the data, a consensus has clearly emerged. The productivity paradox has given way to the productivity payoff at long last.

—E.B. Baatz

dollars to replace its mainframe-based system with PCs and a relational database that will allow sales associates to track potential customers. But ROI has never entered into the management decision.

"If we didn't think it was going to be profitable, we wouldn't be doing it," says Cooper Communities' President and CEO Roger McMennamy. "Ultimately, our measure of success will be the bottom line." McMennamy says he disdains going to the



ROGER MCMENNAMY: *arguing for shades of gray*

"men with the little green eye shades" for this kind of decision. "Very few things in life are black and white," he says. "But that's part of business—you do the research, and then you do your best."

Business decision making has always been a matter of weighing the risks against the opportunities and then leaping. Yet, too many companies leap into expensive technology for merely marginal returns, warn critics Roach and Strassmann. Besides, the margin-squeezing 1991 recession forced senior management to insist on lowered costs and real

returns. For many in corporate America, that means using more, not less, metrics.

"Don't get seduced into acquiring software for incremental improvements—that was Roach's lesson," says David Carlson, senior vice president of corporate information systems for Kmart Corp. in Troy, Mich. At Kmart, upgrading software—once treated in a more cavalier way—is now regarded as an investment that must improve productivity and meet the test of rigorous economic standards for return on investment.

The difference today is that the IS department is no longer solely responsible for the IT investment decision. "There has been a maturation process taking place," says Brian Reynolds, a senior manager at Boston-based consulting firm Nolan, Norton & Co. "Management has come to realize that IS cannot produce benefits; only users can produce benefits."

Kaiser Permanente Foundation Health Plan for the Mid-Atlantic States, an HMO headquartered in Oakland, Calif., illustrates this shift. Director of Information Systems Robert Stallings says users a few years ago were accustomed to sending a memo to the information systems

steering committee whenever they had an IS project request. But with cost pressures on health-care providers rising and request memos piling up, frustration on the committee also grew. "We were like a starving family sitting around trying to figure out how to divide up a single pea," says one doctor.

Says Stallings: "We needed a better way to divide up that pea."

So, with the help of Nolan, Norton consultants, Kaiser Mid-Atlantic designed a new process. Now, end users fill out a 13-page standard form that establishes scores for sev-

eral qualitative investment factors as well as the traditional ROI calculations. With the help of a Kaiser IS analyst, users must assess strategic impact, technical and organizational risk, and the current condition of the relevant business processes. There is still plenty of room for subjectivity in rating the qualitative factors, but users are now thinking about and participating in decision making, and the steering committee is prioritizing projects in a more orderly way. "I think my customer breathed a sigh of relief and said, 'At last! Some order to the process,'" says Stallings.

Kaiser and others have in fact made radical changes in their evaluation of IT. Morgan Stanley's Roach suggests these changes are one reason the productivity data (as inadequate as that data may indeed be, he admits) is finally showing gains. "The user community has gone through a catharsis" and is demanding business value, he says. "And managers are now more mindful of the metrics and have a more con-

One reason financial metrics sometimes do not work in predicting success or failure for IT investments is simply that technology is becoming more and more pervasive throughout the organization.

scious awareness that technology has to be used to boost efficiency and productivity." Even more importantly, says Roach, a business strategy for IT investments is evolving.

For example, Carolina Power & Light incorporates its IT investment decision making into the planning function. Between 1989 and 1992, the company spent a whopping \$44 million on a customer-information-management system. The project involved setting up a systemwide DB2 relational database on an IBM main-

frame. The strategy the investment supported was better-quality customer service at the lowest possible cost. "That wasn't a trivial project, and we did everything we could to keep the costs down," says Tom Dwyer, vice president of information services.

It was imperative to link the spending to business goals; but how? Traditional ROI measures are helpful, but they don't always capture the entire scope of the organizational changes being proposed. Enter planning. In 1987, the company established a new arm of the management services department (which coordinates corporate planning) called the information architecture group. "This is an intermediary body of four persons who are part of the corporate planning department but who also interact closely with the line management," explains Dwyer. The members of the architecture group are line managers who serve two-year stints and then go back to their respective units in cus-

...Hello EVA

The meaning of value gets a fresh definition

With the understanding that it's not the willy-nilly application of information technology but its proper management that encourages productivity comes a new emphasis on economic profit or, as it is known today, economic value added (EVA).

The question, "What is value?" has plagued scholars as far back as the 14th century. Twenty-first century consultants like Paul Strassmann, of New Cannan, Conn., are applying basic economic concepts of value to their understanding of what makes IT pay.

In a nutshell, here's how Strass-

mann calculates value added. By delving into the innards of annual reports, Strassmann winnows down revenues. First he subtracts the cost of purchased goods, energy and services, as well as interest costs and taxes. Then he subtracts shareholder value added, operations costs and management costs. What's left over is management value added.

Strassmann calls the ratio of management value added to management costs "return on management," or R-O-M (not to be confused with read only memory).

Why is R-O-M important? Because return on equity, return on assets and every other traditional financial metric ever studied have failed to yield a positive correlation between business performance and IT investment, says Strassmann. And that gave rise to the productivity paradox; nobody could tell why some companies succeed, with IT

investments yielding revenue growth, and other companies fail. R-O-M is the only statistic Strassmann tested that has shown a positive relationship to IT spending.

But doing value-added analysis on your company can be a bit like a painful visit to the doctor. If your company is ill, there may be tough medicine to swallow. Nonetheless, such Fortune 1000 companies as Coca-Cola, Harnischfeger Industries, AT&T and Quaker Oats are using EVA metrics now. And a few of them are even tying executive compensation to the data.

Strassmann has now licensed his R-O-M techniques to the consulting firm of Ernst & Young. For more information, fax Strassmann at 203 966-5506, or E-mail to pstrassmann@attmail.com. Or call Ernst & Young's Management Consulting Information Center at 800 578-1580.

—E.B. Baatz

tomer service, power operations, nuclear generation or corporate finance.

"It's seen as a good career move," says Dwyer. The architecture group's members interact with senior management, get exposure to IS and are guaranteed to return to their original units. As part of the corporate planning function, this structure ensures that the strategy for any major IT project is conveyed to the business lines and is on target for the users.

One reason financial metrics sometimes do not work in predicting success or failure for IT investments is simply that technology is becoming more and more pervasive throughout the organization. What is an investment in IT equipment and what is an investment in physical plant has become indistinguishable.

For example, the New York Federal Reserve Bank (FRB) spent \$80 million on a new building in East Rutherford, N.J., and the building is loaded with IT. Instead of lugging around bags of cash, the FRB now loads cash into specially designed crates, which are then locked with a secure seal, labeled with a bar code and shipped to New Jersey for storage. Upon arrival, a scanner reads the bar code, the data is transferred to computers, the money is lifted by computerized cranes and transferred robotically on electric tracks to an underground vault three-stories high.

The IT investment in this case must be broadly defined, says Israel Sendrovic, executive vice president for automation and systems services for New York FRB. "The traditional metrics of time, cost and quality are still important," says Sendrovic,

"but they are no longer sufficient." Sendrovic uses additional metrics in an attempt to understand such intangibles as increased responsiveness, ease of access to information, flexibility, security and resilience.

"As a result, the days when an IT guy could go in alone and present a proposal are long gone," says Sendrovic.

Exactly how a company chooses to classify technology investments is highly variable, so measuring IT costs may be misleading, and comparing IT spending-to-revenue ratios across different companies may be useless.

The argument can be taken even further. "Information technology does not require unusual analytic

methods and does not deserve special treatment," says Strassmann. But Strassmann is the first to admit that traditional financial metrics that grew up in the manufacturing-based 1920s and '30s are inadequate for the knowledge-based 1990s.

It may have taken until 1994, but many managers are coming to the realization that bad IT metrics don't explain or excuse the productivity paradox. "Achieving value from IT is not an investment decision; it is a management process," says Professor of MIS John C. Henderson, director of the Systems Research Center at Boston University. Thus, business managers who meet once a year to make investment decisions and then hand projects off to the



ROBERT STALLINGS: *a better methodology for dividing up finite resources*

technologists are taking a big risk.

"Getting payoff from technology is just not a passive exercise," agrees Professor Howard Rubin of Hunter College in New York. "People aren't yet aware of the navigation measures, because they still view technology as self-harvesting. The next generation of measures will enable organizations to take control of the *rate* of the rate of return."

The microscope now is trained not solely on IT metrics and return on investment but also on measures of management effectiveness and risk.

One concept that seems to be gaining credibility in the IT world is an old Alfred Marshall theory of economic profit taught in all microeco-

"The traditional metrics of time, cost and quality are still important, but they are no longer sufficient."

—Israel Sendrovic

nomics classes. Under the consultant jargon of New York-based Stern Stewart & Co., the theory has been renamed (and trademarked as) "economic value added" (see related story, Page 44). Stated most simply, economic value added is revenue minus all costs. (Current accepted accounting principles deduct only interest on debt from profits but not the cost of equity capital.)

Exactly how a firm's chief financial officer decides to calculate costs is up for grabs, but IT consultants such as Strassmann are delving deeper into corporate financial reports in order to focus not just on financial outcomes but on management productivity. Strassmann's study of value added and IT spending for 200 companies in the Fortune 1000 will be released later this year. In it, he concludes that companies with a high value added do a better job of managing information technology investments than companies with a low value added.

The other breaking trend in IT metrics is "real options theory." By applying mathematical models developed in the finance arena during the 1970s, researchers like Boston University's Henderson are exploring ways to measure the value of flexibility and the value of potential follow-on investments that arise from a particular IT infrastructure investment. Unlike net present value or discounted cash-flow analysis, which are biased toward projects with the quickest payback, the options theory allows managers to explicitly model risk and uncertain payoffs.

"Most IT organizations suppress uncertainty," says Henderson. "Their culture is one of risk avoidance. But CEOs do not mind taking a risk; they just want to manage it. The options model gives you a process to manage it." Henderson is testing his IT options model on Boston University and on one business (which he declines to name now). Early results should be available next year.

There remains an ever-present danger in becoming too focused on the Holy Grail of ROI. Metrics are a snapshot of the past. "You can't always be looking in the rearview mirror, tracking yesterday's trends, or you may miss opportunities to use IT to your company's competitive advantage," says Ernst & Young's Gold. And after all, isn't managing IT risk in order to create business opportunities where management comes in? **CIO**



ISRAEL SENDROVIC: trying out new ways to measure intangibles

PHOTO BY JOHN RAE

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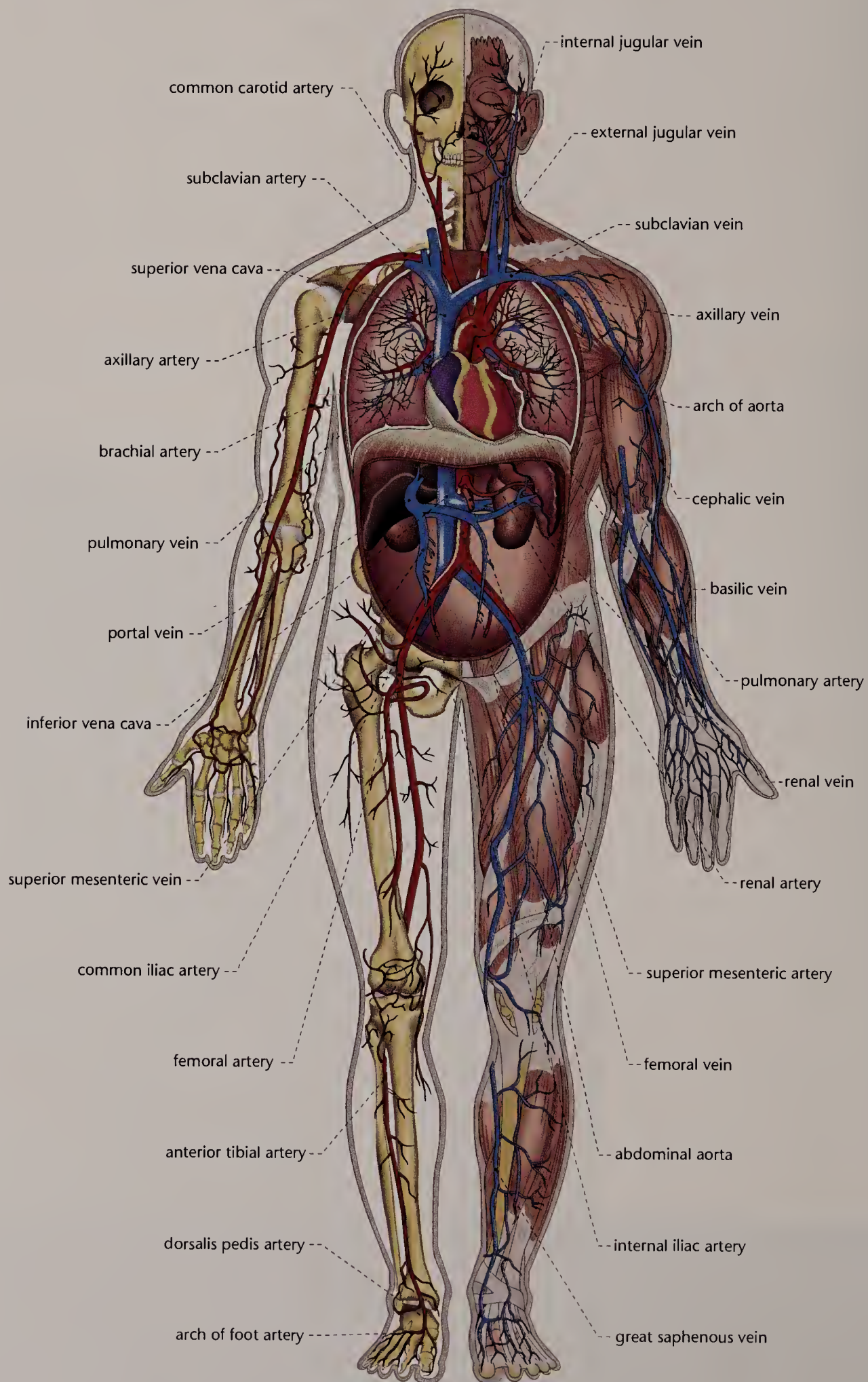
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ALL *for* ONE

Rather than offering one standard product for all consumers, some companies are using mass customization to give individual customers exactly what they want—at a reasonable price

BY ANNE STUART

Say you're in the market for a pager. But none of the standard models offers quite what you want. No problem, says Motorola's Paging Products Group: Design your own and we'll make it for you. Choose the frequency, software, tone, case color, holster or belt clip and a few other components, together creating more than 29 million possible combinations.

Motorola can produce that custom-built beeper in about two hours or less—without reconfiguring the assembly line. And the dream pager won't cost any more than its off-the-shelf predecessors. Even if you buy just one.

It's increasingly becoming reality: Companies can tailor their products to individual specifications as quickly and cost-effectively as they can mass produce them. The process, known as mass customization, has been used to create customized products as wide-ranging as bay windows, bicycles and birthday cards. But it's not limited to manufacturing. Other companies are customizing marketing, distribution, delivery and, increasingly, customer service. The ultimate goal: Give customers exactly what they want, when they want it, for a reasonable price.

If mass customization sounds like an oxymoron, it is. Or, more accurately, it *was*. Until recently, mass production and customization were mutually exclusive, the former offering high volume at low cost, the latter offering low volume at high cost. But with the IT revolution, they've merged into a hybrid demonstrating the best qualities of both parents. "It resolves the long-standing trade-off between quality and cost and between efficiency and

customization," says B. Joseph Pine II, author of *Mass Customization: The New Frontier in Business Competition* (Harvard Business School Press, 1993). (See "Many and Varied," *CIO*, May 15, 1993.)

As a result, says Stan Davis, an author and consultant based in Brookline, Mass., it's increasingly possible to identify and serve "a massive number of markets of one."

Farm Journal, a venerable Philadelphia-based publication that reaches 800,000 farmers nationwide, does just that. If a herbicide manufacturer, for example, wants to advertise in the journal but wants to reach only corn growers in, say, 24 counties in Michigan and Ohio, it can. Subscribers who raise soybeans or who live in California will see something else on that page—a similarly specialized ad or specialized editorial content. "You literally could have readers living across the street from each other getting basically different issues," says Publisher Roger Randall.

While it has long been viewed in terms of the future—Alvin Toffler predicted the phenomenon nearly 25 years ago in *Future Shock* (Bantam Books, 1970), and Davis coined the term in *Future Perfect* (Addison-Wesley, 1987)—mass customization is rooted in the craftsman-



RUSSELL STROBEL: *IT is the glue that makes possible customizable modularity.*

ship of the past. "We had, before the industrialized economy, customized production," Davis says. "If you wanted a shirt, the tailor made you a shirt. If you wanted a chair, the carpenter made you a chair."

Then, of course, came the Industrial Revolution, which let manufacturers turn out huge quantities of identical items quickly and cheaply, though at the expense of diversity. It was mass-production pioneer Henry Ford who said customers could buy the Model T in any color they want-

ed—as long as it was black, the fastest-drying shade of paint.

Almost immediately, competitors came out with other hues. And customized goods and services were still viable for some consumers who could afford premium prices and a long wait. But overall, mass production ruled.

More recently, though, the IT revolution has allowed organizations to focus production efforts ever more precisely on specific markets, then market segments, then niches and,

finally, individual customers. "It's really the new technologies that allow it to occur," Davis says. "I don't think you can mass customize without the IT."

While those technologies vary from electronic data interchange (EDI) to robotics (see box, Page 53), Davis says they all share two attributes that provide the foundation for mass customization: speed and specificity. Put another way, they enable the company to meet every customer's needs right now—and at a competitive price.

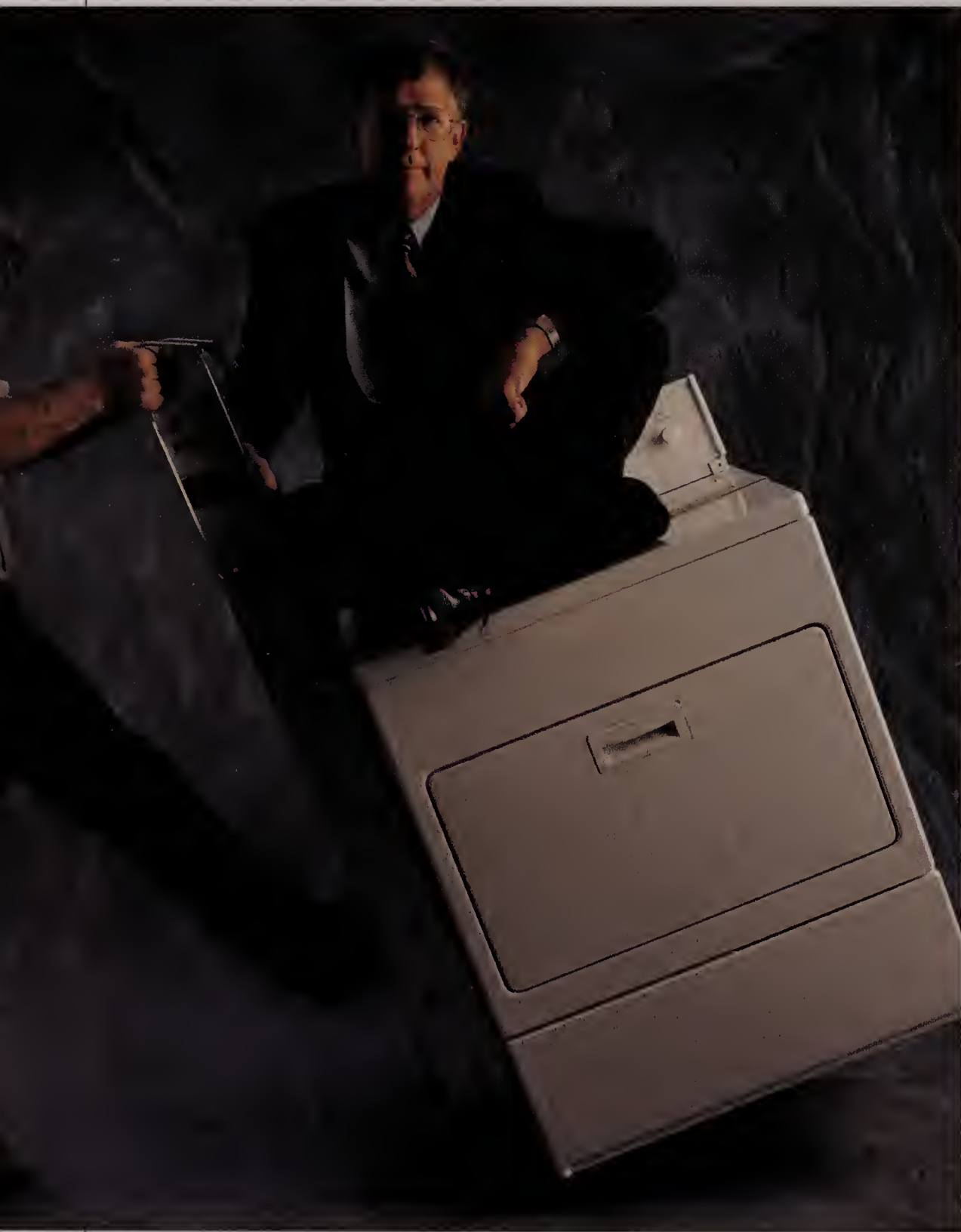
Where does quality fit into the picture? With mass-produced goods, as any consumer knows, it sometimes doesn't. Mediocrity may well be the trade-off for getting something fast and cheap. In contrast, custom-made products and services are almost always of better quality because they

"Anybody can make one robot do one thing. The trick is to make 50 of them dance together. The computers are the master choreographer."

—Russell Stobel

offer a perfect fit—they're just what the customer ordered. Unlike mass production, which depends on what companies think customers will want in the future, mass customization stems from what companies know an individual customer wants now.

Some of America's best-known companies have been mass customizing for a while. The most obvious example: Burger King Corp., which forever changed the fast-food industry with its "have it your way" service. Eyeglasses and most new



DENNIS SWANSON: Giving a whole new meaning to "delivery"

PHOTO BY MARC BERLOW

houses are also mass-customized to some degree.

Andersen Corp., the Bayport, Minn.-based manufacturer of doors and windows, has offered customized products for years. American Greetings Corp. and Hallmark Cards Inc. both operate retail kiosks that produce personalized greeting cards. A more-recent entry is MusicWriter of Los Gatos, Calif., whose music-store kiosks can instantly produce sheet music for thousands of songs in a dozen different keys.

In a few cases, mass-customized products are custom designed. For example, engineers at Ross Operating Valve Co. in Troy, Mich., use computer-aided design (CAD) workstations to create valve prototypes to customer specifications (see "Haste Makes...Money," *CIO*, May 1, 1994). In Japan, a just-in-time inventory system based on bar coding lets the Osaka-based National Bicycle Industrial Co. Ltd. build Panasonic Co. bicycle frames to individual riders' measurements; the company then finishes each bicycle with the buyer's choice of color combination and options. With 11 million possible variations, the finished product falls somewhere between a top-of-the-line mass-produced bicycle and a truly built-to-fit machine. "It isn't cooked from scratch, exactly, but it's awfully close," says Robert W. Hall, professor of operations management at the School of Business at Indiana University in Indianapolis.

Usually, though, mass-customized products are assembled to order from available components on highly agile production lines. Using the Chinese-menu approach—one from this category, one from that category—customers choose their options and the factory assembles the product. "They offer enough combinations that, for practical purposes, it's custom made," says Hall.

Often, as in Motorola's case, manufacturing is so highly automated that one assemble-to-order pager can be mixed in with a larger batch order without disrupting production. After receiving sales orders, an automatic line controller sends basic pager units

Support Resources for Mass Customization

Almost all mass-customized products, services and processes share the underlying principles of modularity, agility, quick response and competitive cost. But applicable IT and management tools vary as widely as the industries using the technique. They include:

• Bar-code order systems	• Groupware
• Client/server networks	• Holography
• Computer-aided design and manufacturing	• Just-in-time delivery
• Computer-integrated manufacturing	• Lean-production techniques
• Concurrent engineering	• Mobile-computing technologies
• Cross-functional teams and employee empowerment	• Object-oriented programming
• Cycle-time reduction	• Point-of-sale systems
• Databases	• Rapid-prototyping techniques
• Design for manufacturing and assembly (DFMA) techniques	• Robotics
• Electronic data interchange (EDI)	• Time-based management
• E-mail	• TQM and continuous improvement
• Flexible manufacturing systems	• Videoconferencing

—A. Stuart

from station to station to receive the requested components; units simply skip stations that don't apply.

Farm Journal's printer, R.R. Donnelley & Sons Co. of Chicago, uses a similar technique to produce up to 9,000 variations on each issue. When

assembles the right combination of targeted ads and editorial copy for each subscriber.

The Textile/Clothing Technology Corp., a trade research group better known as [TC]², is coordinating a variety of experiments to mass customize garments. In one effort, 35 "virtual partners," ranging from designers to delivery companies, are working to design, cut, print, sew and deliver a garment in the customer's choice of size and pattern—within 48 hours. Currently, the effort, which relies on the intricate coordination of software, hardware, networking, voice, video, data communications and more than 75 people, happens only at trade-show demonstrations. And customers can order only a blouse or a skirt in one of three sizes and a limited choice of colors and patterns. But Joseph Off,

"I don't think you can mass customize without the IT."

—Stan Davis

subscribing, farmers provide details about agricultural specialties and acreage. Using a database of that information, Donnelley automatically

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managing director for the Cary, N.C.-based association, says the experiment shows "it's a very small step to tomorrow." Eventually, he predicts, body scanning and high-speed laser cutters will provide truly custom-tailored clothes in record time.

Mass customization is also emerging in service industries. TWA Getaway Vacations of St. Louis, for example, offers customized trips at package-tour prices by buying all the vacation "pieces" in bulk. Customers work with travel consultants to mix and match options for flights, entertainment, hotel rooms and car rentals until they hit the right combination at the right price.

Hugh Martin, assistant vice president of the personal lines business group at ITT Hartford Insurance, says the Connecticut insurance giant overhauled its customer-service processes to provide more-personalized attention. "In the insurance business, one way we used to think about service delivery was in averages. We would do customer research and determine that the average customer would like a new policy in two weeks," Martin says.

Now, he explains, "we've developed a commitment-tracking system where, when we go to issue a policy, we ask what the customer's service needs are and then commit to meet those needs." If the customer buys a new car today and needs coverage by tomorrow, an associate will make sure it's issued in time. If the customer isn't taking delivery for six weeks, the associate ensures delivery then.

The system hinges on a database that profiles customers, maintains a diary of customer contacts and even helps evaluate employees. "Their ability to meet commitments is part of their annual performance reviews," Martin says.

Another example is Quality Express, a new delivery system appliance maker Whirlpool Corp. uses primarily to get merchandise to its dealerships. Dennis Swanson, national logistics director, sums up the effort's mission this way: "It's delivering products to customers when,



DAVID LOSCH: geared up to "handle exceptions as the regular part of doing business"

where and how they want them." Sounds simple, but Quality Express goes several steps beyond rhetoric—delivery personnel unload and, if re-

"Customers don't want more choices. They just want exactly what they want."

—B. Joseph Pine II

quested, unpack, customize and install appliances as well, usually for dealerships but sometimes also for individual consumers. And they can do it on one day's notice.

Whirlpool, based in Benton Harbor, Mich., launched Quality Express to solve two major delivery problems: late arrivals and point-of-delivery damage. Officials attributed the problems to too many handoffs

among the manufacturer, warehouses and delivery companies. So, Whirlpool formed partnerships with those parties to control the process from factory to dealership or, in some cases, the consumers' homes.

Then the company implemented a sophisticated automated scheduling program that mixes and matches pick-up, drop-off and service orders based on distance between locations, number of units per stop and other considerations. Whirlpool says its partnerships and reengineering of the delivery process have improved on-time delivery from 85 to 99.9 percent and reduced delivery damages by better than 90 percent.

Modularity—a.k.a. the Lego approach—is critical to making mass customization work for both products and services. "If you can design your product with a high degree of modularity, then you can have a single process that becomes highly flexible and responsive by mixing the modules together," says

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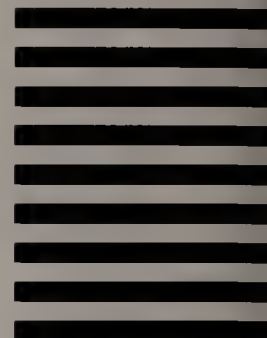
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Mass Customization author Pine.

Obviously, IT makes modularity possible. For service companies, groupware products such as Lotus Notes tend to be the premiere enablers; for manufacturers, key technologies usually involve integrated, automated production. As Russell Strobel, business manager for Motorola's Paging Products Group in Boynton Beach, Fla., puts it: "Anybody can make one robot do one thing. The trick is to make 50 of them dance together. The computers are the master choreographer."

Beyond that, mass customization requires breaking out of the mass-production mind-set. And that means cultural changes. "You almost have to get out of those great functional silos. They are great for efficiency, but they have a lot of rigidity," Pine says. Not surprisingly, he recommends shifting to cross-functional teams.

Pioneers have already made the switch. Chemical manufacturer Olin Corp. customized services by replacing a centralized order department at its Stamford, Conn., headquarters with service teams at each of a half-dozen factories nationwide; teams will handle all customer service, from order taking to payment collection.

At ITT Hartford, associates became more interdependent when they received greater responsibility for tracking and fulfilling customer commitments. "Previously, they each were just a cog in the wheel: 'I'll do my task, I'll assume everybody else does their task, and we'll try to meet this average,'" Martin says. Now each has a broader perspective—and bottom-line accountability. "They have to be able to manage the total resources of the organization to help the customer, as opposed to just being a part of the whole process," Martin says.

Still, mass customization isn't for everyone. "It's not really appropriate in the true commodity industries," such as oil, gas and wheat, Pine says. Regulations may limit or ban customization in other areas, such as government and utilities. In some industries, customers simply

don't want or need personalized products or attention.

It's also possible to offer too many options. Overabundant choices set

*"You literally
could have readers
living across the
street from each other
getting basically
different issues."*

—Roger Randall

up more things that can go wrong and may baffle and irritate customers so much that they go else-

where for simpler solutions. "Customers don't want more choices," says Pine. "They just want exactly what they want."

The approach also changes relationships with customers, typically bringing them much closer to research and development. Overall, consultants say, knowing the customer is a good thing. But that assessment comes with caveats.

"Listening to the customer is the politically correct thing to do," says Rick Dove, director of strategic analysis for the Agility Forum at Lehigh University in Bethlehem, Pa., and chairman of Paradigm Shift International, a consultancy based in Oakland, Calif. "But there are times when we shouldn't." Sometimes, he says, customers simply don't know what they want.

For example, when working with machine-tool suppliers several years



ROGER RANDALL: Database and magazine binding technologies combine to enable endless content variability.

ago, he heard suppliers complain that even though they gave their automotive-company customers precisely the products they requested, the customers still defected to Japanese competitors. "They went to Japan because Japan didn't figure out what they wanted; Japan figured out what it could give them," says Dove. "When they saw it, they wanted it."

Finally, customization may create a monster in the form of much high-

er customer expectations, as have its close relatives, quality and continuous improvement. It's already happening at Olin. "Customers have gotten more and more demanding of their suppliers to respond to individual customer needs," says David E. Losch, a member of the cross-functional team overseeing the change. "Ten years ago, we would have said [of an individual request], 'That's too complicated, we won't do it,' " says

Losch, formerly Olin's business manager for chemical specialties. Now, he says, Olin is geared up to "handle exceptions as a regular part of doing business."

Michael Malone, co-author of *The Virtual Corporation*, has noted that today's leaders know as little about the implications of mass customization as their predecessors a century ago knew about the implications of the telephone, the phonograph and electric light. But they do know it's creating new institutions and new opportunities.

Ultimately, consultants say, customers may be able to get almost anything mass customized. David R. Strip, manager of the intelligent system principles department at the Sandia National Laboratories in Albuquerque, N.M., describes it this way: "Really customizing a car wouldn't be just choosing between this radio and that radio." Rather, he says, it would give customers the ability to say, "I'm 6 feet tall, and I'm uncomfortable in the driver's seat. Can you raise the roof line 2 inches when you build my car?"

Design consultant Jim Sias says consumers may someday buy many products from vending machines, setting their own specifications for size, color, shape and other variables. "It's just short of *Star Trek*, where you say, 'Computer, make a whatever,' and it pops out the door," says Sias, also a professor at the Rochester Institute of Technology in Rochester, N.Y. But the frontier isn't endless: Sias says customization may simply prove too costly for some lower-end consumer products.

For that reason, consultants say, mass production won't disappear. "There are a lot of products that are going to be mass produced for all kinds of reasons," including common sense, Hall says. "Do you really want to [personalize] a toothbrush?" Then he pauses, muses and adds: "On the other hand, there's nothing more unique than your tooth. And if you're really serious about dental care...." There might be a market for that mass-customized toothbrush after all—if the price is right. **CIO**

Custom Counsel

Experts offer tips on making mass customization work

Thinking about mass customizing a product or service? Here's some advice from the pros—the organizations already putting the "custom" back in "customer":

- **Check out the market.** Determine whether customers want customization and, if so, how many options they really need.
- **Think modular.** Design products and processes with interchangeable parts.
- **Plan extensively.** ITT Hartford's mass-customized service approach started slowly because a new system needed expansion and some employees lacked the level of listening skills that were required. If the company could do it over, says Hugh Martin, assistant vice president of the personal lines business group, "we'd prepare a little more in terms of training and systems."
- **Schedule carefully.** Veterans warn that a mass-customization campaign can run out of steam if it's competing with reengineering or other major projects.
- **Keep everyone informed.** Make sure all employees, partners, vendors, suppliers, customers and others understand the effort.
- **Sell the change.** Get enterprisewide support. "The people who are involved in it have to buy into the theory," says Jim Sias, a design consultant and professor at the Rochester Institute of Technology.
- **Focus on the big picture.** Otherwise, says Martin, "you get so involved in putting out fires and solving day-to-day problems" that it's easy to lose sight of your ultimate goals.
- **Create a learning environment.** Build a mechanism for feedback and encourage all to share what they learn.
- **Track results.** Develop cost and service goals, such as Whirlpool's on-time delivery and damage figures, to measure performance.
- **Build in the ability to change quickly.** You'll need it.

—A. Stuart

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Grow with the Flow

Workflow software is diversifying from its image-processing base to encompass tools for analyzing business processes and for tracking and sharing all kinds of information

BY DENNIS LIVINGSTON

Workflow packages—programs designed to manage the flow of information among interlocking tasks in an organization—have become vital tools for cost-conscious corporations. They help streamline the processes by which purchase orders, mortgage applications, customer letters, project reports, forms and other data sources are passed along the decision-making chain. Now, as a result of recent developments, companies have more options than ever for managing how and to whom information is distributed and how it is used.

The first wave of workflow software consisted of image-processing products that enabled companies to electronically store, index and retrieve scanned documents. That took care of misplaced or lost file folders, data-entry errors and the delays inherent in manually locating and sending along requested folders, among other problems.

Most imaging customers, however, needed more than just an electronic version of the office filing cabinet to

justify their investment in document management. The next product wave integrated imaging capabilities with technology to monitor, route and track digitized documents. Such workflow-enabled software could send documents to specified individuals according to predefined rules.

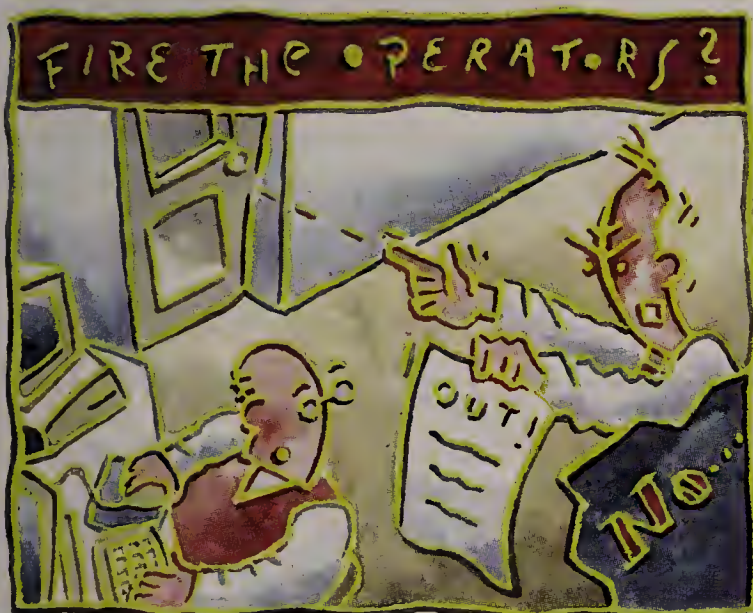
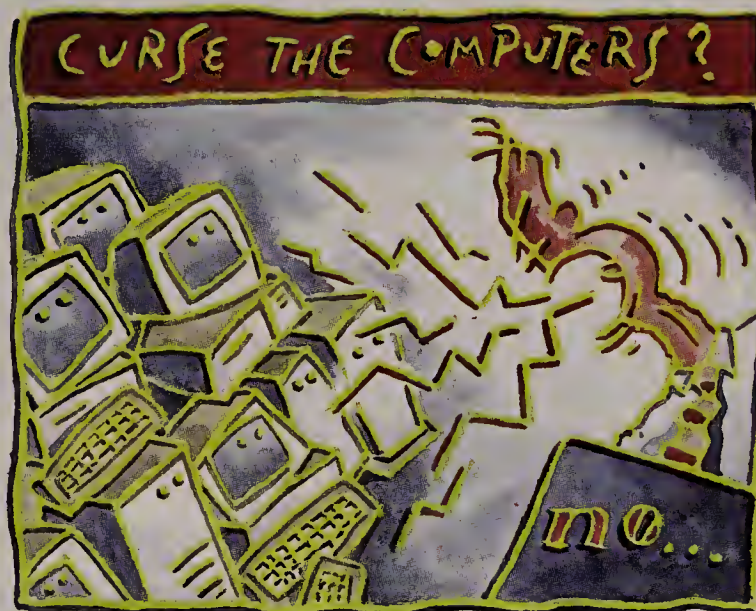
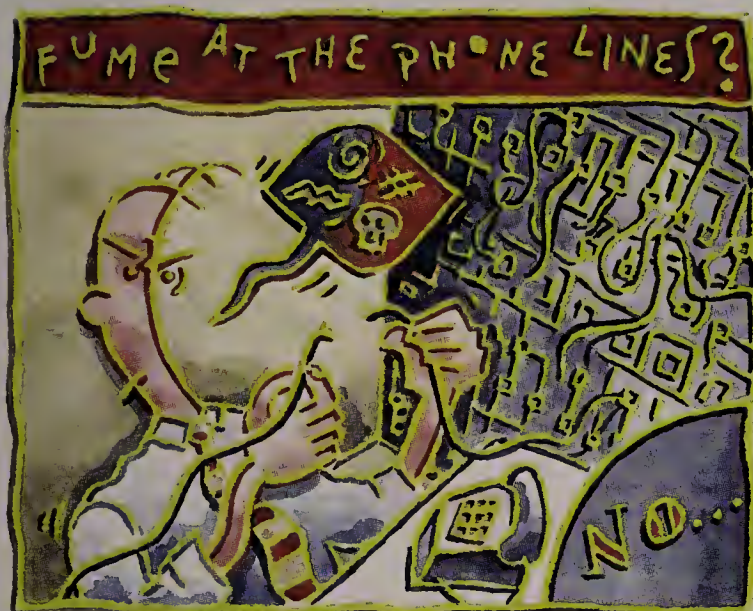
The latest generation of workflow software is expanding beyond its paper-centric origins in two complementary directions. On the one hand, workflow functions are being incorporated into a variety of nonimaging applications, such as electronic forms, workgroup software and electronic mail. At the same time, both imaging companies and purebred workflow vendors are offering standalone, "image-independent" workflow design tools. Such products help companies improve their understanding of business processes (they are often used in corporate reengineering projects) and their control of data elements such as computer-generated text, structured files, voice annotations and video. They typically feature enhanced versions of the management and analytical functions previously available in high-end imaging systems, including capabilities for workflow monitoring, routing, filing and auditing.

"Documents are still the core medium of information exchange for most business processes," says David Ruiz, corporate director of marketing and strategic alliances at ViewStar Corp. "But information does not have to take the form of digitized paper to be part of the workflow."

Reengineering advocates hold that before you automate existing and possibly inefficient work processes, it makes sense to examine why things are done the way they are done in the first place. The modeling, simulation and tracking capabilities



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of workflow packages can help in this endeavor by enabling planners to visualize—perhaps for the first time—how information is passed along from one job sequence to another.

The very act of modeling workflow procedures may itself suggest alternative ways of accomplishing business tasks. “We found that a lot of people don’t do comprehensive reengineering first, as you might think,” says Dean Cruse, director of strategic marketing at Recognition International Inc. “Many customers implement a workflow-automation system, see where bottlenecks occur and reengineer the tasks involved as they go along. That’s a more comfortable, evolutionary approach to job change, and one that can still have a big impact on the corporate bottom line.”

Object-oriented technology, what-if capabilities, accessibility on a range of popular platforms linked by client/server networks and the use of alternative workflow methodologies are some of the features highlighted by vendors in their workflow design software.

“Object technology allows our customers to more easily build, maintain and change applications based on previously defined common functions that occur in all business processes, such as calculation of loan-payoff options,” says Jordan M. Libit, FileNet Corp.’s vice president of marketing. “You don’t have to start from scratch every time you construct a workflow diagram, and the programming requirements to implement the system are less demanding.” The company’s Visual WorkFlo, a component of the WorkFlo Business System, utilizes icons representing work steps and has a point-and-click interface.

Action Technologies Inc. stresses the ease of use of its what-if modeling tool, ActionWorkflow Analyst (a component of ActionWorkflow System), which lets users model, analyze and redesign business processes through point-and-click operations. The result is a map that depicts who performs work and how, how long it takes and the impact of various tasks on each

other, including values for such parameters as costs and conditions of satisfaction. A completed map is automatically checked to identify inefficient links and inconsistent time and value allocations. Once a map is optimized, the information it contains can be moved to ActionWorkflow Builder to develop workflow applications. These applications are then deployed through the enterprise using ActionWorkflow Manager, which is the workflow engine for the system.

“Documents are still the core medium of information exchange for most business processes. But information does not have to take the form of digitized paper to be part of the workflow.”

—David Ruiz

Action Workflow Analyst brings modeling capabilities to the mass market. “We don’t believe that only consultants can analyze workflow,” says Shirish Hardikar, Action’s vice president of marketing. “Providing a Windows-based product with a low price point, easy consistency checking and an interactive multimedia tutorial makes it possible for any professional manager to get involved.”

Beacon Street, from Process Design Sciences, follows a different approach to workflow restructuring. “Our research shows that white-collar work really doesn’t flow at all,” says Colette Lemire, the company’s communications director. “Work occurs in chunks. Up to 70 percent of a business process, for instance, may consist of the start-and-stop, get-ready steps people take in accomplishing a task. These nonvalue-added work fragments are incredibly inefficient.”

Process Design software identifies what really takes place by de-

composing the work process. A baseline work analysis starts by asking employees to describe physically how they do their work. The descriptions can be mapped to action verbs and nouns, such as “walk to the cabinet” and “pull a bill.” The verb-noun lists, in turn, are linked with imaging, E-mail and other technologies that can help automate time-wasting steps. The end point of this exercise is a five-year cost-benefit analysis and operational scenario spelling out the changes that will take place as a result of implementing the indicated technologies.

Even with their growing sophistication, workflow tools may still need to be customized for particularly complex projects, according to Tim Andrews, vice president of technology at CSC Consulting in Cambridge, Mass. “[Such products] tend to make rigid assumptions about things like what a task is, what kind of work needs routing and when an event is completed or not; [these assumptions] may not be easily applicable to high-level applications,” he says.

Once workflow processes have been designed, there are a host of tools to use in their implementation. Scott McCready, director of imaging and workflow at International Data Corp., a Framingham, Mass.-based market-research company owned by CIO’s parent firm, categorizes nonimaging workflow products into those applicable to production, ad hoc and administrative business processes.

■ Production workflow typically involves the automation of complex, high-volume, structured work sets characteristic of claims processing and other intensive transactions. This is the realm of workflow-enabled imaging software, with its emphasis on routing, tracking and customization features.

■ Ad hoc workflow products automate less-structured processes, such as those involved in developing strategic plans, advertising campaigns, sales forecasts and similar project-oriented activities carried out by higher-echelon white-collar work-



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Action Technologies Inc. 800 967-5356 <i>ActionWorkflow System</i> *	Lotus Development Corp. 617 577-8500 <i>Lotus Notes</i> †† <i>Lotus Forms</i> **	ViewStar Corp. 510 337-2000 <i>ViewStar (Process Architect)</i> *
Banyan Systems Inc. 800 222-6929 <i>BeyondMail</i> † **	Microsoft Corp. 206 882-8080 <i>Microsoft Electronic Forms Designer</i> **	Wang Laboratories Inc. 508 459-5000 <i>Open WorkFlo</i> *
Computron Technologies Corp. 201 935-3400 <i>Epic/WF</i> *	Network Imaging Systems 703 478-2260 <i>1View</i> *	WordPerfect Corp. 800 861-2507 <i>WordPerfect InForm</i> **
Delrina Corp. 800 268-6082 <i>Delrina FormFlow</i> **	Process Design Sciences 800 776-2377 <i>Beacon Street</i> *	Workgroup Technology Corp. 617 674-2000 <i>CMS/Workflow</i> *
FileNet Corp. 800 345-3638 <i>WorkFlo Business System (Visual WorkFlo)</i> *	Reach Software Corp. 408 733-8685 <i>WorkMAN</i> *	WorkPoint Systems Inc. 402 398-9935 <i>WorkPoint</i> *
IBM Corp. 914 288-3323 <i>FlowMark</i> *	Recognition International Inc. 408 743-4300 <i>Plexus FloWare</i> *	

Key to Product Types
* = Workflow management
** = Forms
† = E-mail
†† = Workgroup

Note: Many workflow-management tools contain forms-design components

ers. The final output of such efforts is typically a document. "Ad hoc processes require a workflow capability that allows you to involve multiple people moving in and out of a project at different stages," says McCready. "You need good feedback tools to know who is contributing what, if the contribution is on time and how it affects the rest of the project." In this context, he adds, workflow connotes not just how work gets from one person to the next but how productive you are once work arrives at your desk. Workgroup software fits this category.

■ Workflow-capable electronic forms and E-mail products fall into the administrative-workflow niche, which

tends to involve simple processes such as transmitting spreadsheet-based expense reports, travel requests and the like. Administrative products are relatively inexpensive on a per-person basis and allow for large scalability.

Workgroup, forms and E-mail products are converging with each other and with workflow technology. For instance, BeyondMail from Beyond Inc., a subsidiary of Banyan Systems Inc. of Westboro, Mass., contains a rule-based scripting language that can be used to file, filter and forward messages according to predetermined instructions. Thus, you could formulate a rule to file incoming news clips in designated fold-

ers according to key words.

BeyondMail users can also create specialized mail-enabled forms incorporating rules that dictate how these forms are processed and routed. Typical forms-related rules might be to total up the figures in a purchase order and forward the result to the appropriate person for authorization or to send a query to a database for a per-unit price. "IS managers can build on these capabilities for more-substantial reengineering tasks," says Alex Cullen, product manager for BeyondMail. He adds that E-mail's widespread familiarity makes it a convenient front end for incremental business-process automation.

Many companies have used Lotus Notes, a workgroup development platform from Lotus Development Corp., in conjunction with other Lotus and third-party products to build workflow applications. For instance, KFC Corp., the food conglomerate headquartered in Louisville, Ky., turned to Lotus Forms to design a timecard for hourly employees. Workers key in their hours and sign the form electronically every two weeks, after which it is automatically routed through Lotus cc:Mail to supervisors. Following supervisor approval, the timecard is sent to a Lotus Notes database, which auditors can query to determine such matters as the amount of overtime workers have accumulated. In addition, checks are cut using information taken directly from the Notes timecard information.

Lori King, KFC's project leader for electronic forms, stresses that it's important to put even so seemingly mundane a process as timecard management in a larger perspective. "It's critical to understand that you don't just redo your existing work steps electronically," she says. "You have to rethink the whole process. As we automated the timecards, we constantly asked why we were doing what we were doing. The point of workflow improvement is not just to eliminate manual paperwork but to have people doing something more constructive with their time." 

Dennis Livingston is a freelance writer based in Brookline, Mass.



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Forms with New Function

Experts say that the average business with 25,000 employees uses about 10,000 standard printed forms for everything from travel-expense reports to information systems request forms. On top of that, another 10,000 ad hoc forms are floating around that workers have put together themselves. Now, imagine what would happen if you could not only automate your forms but change them from static pieces of paper to dynamic, electronic workflow tools.

The Internal Revenue Service of Canada and the U.S. Army are doing just that with Delrina Corp.'s FormFlow. The Windows-based software allows form designers to program custom forms with icon-clicking ease. FormFlow 1.1 uses a new EDI-like capability to route forms and data as binary files via fax live to users anywhere in the world. Trading partners can seamlessly exchange forms-based information as



easily as sending a fax. And the data that has been input by the people filling out each form can be harvested for complex business analysis in programs such as Lotus Notes and Excel Access.

The software can be deployed in Windows and DOS environments now; Mac and Unix platforms will be supported later this year, and Microsoft's Chicago platform will be compatible in the future. FormFlow starter kits begin at \$399. Call Delrina at 800 268-6082.

Object for Images

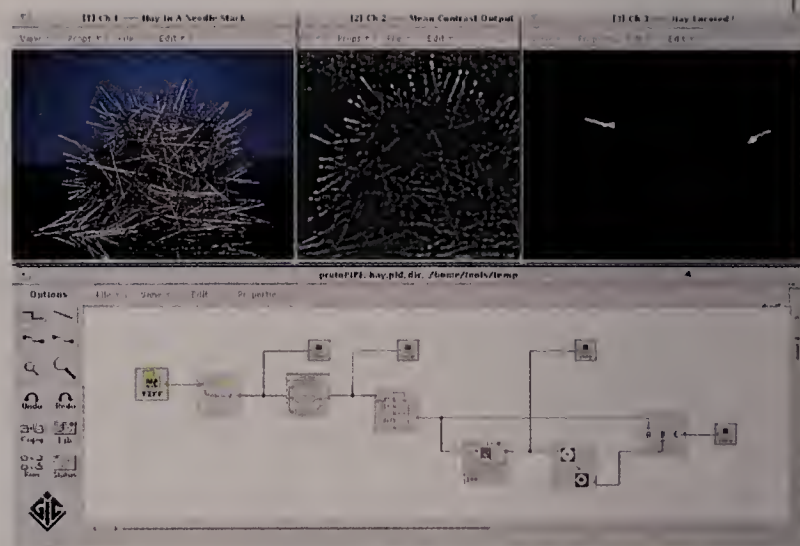
Some may not have been built in a day, but thanks to a new application-development environment from General Imaging Corp., it's possible that your next data-imaging application can be.

ProtoPIPE is a suite of object-oriented tools based on drag-and-drop technology that allow users to graphically design, develop, test, simulate and execute data-imaging ap-

plications in a fraction of the time that would be required using traditional programming techniques. Images can be edited, analyzed and displayed in a wide range of data formats, including grayscale, color, numerical, analytical and plots. ProtoPIPE also includes a library of more than 200 reusable image-processing algorithms.

The tools can be used on standalone, networked or client/server systems with an object-oriented interface. Applications can be executed on a single processor or distributed across a multiprocessing environment.

The standard version of ProtoPIPE is SPARC-based and costs \$10,000 through year's end. For more information, call 800 255-1577.



Preserving Document Integrity

Adobe Systems Inc. came to prominence in the mid-1980s on the strength of PostScript, a kernel of indispensable smarts that became the de facto standard in laser printers for the coherent presentation of text as formatted pages.

Adobe, based in Mountain View, Calif., has moved on to address more-complex document-management challenges. In 1993 it released Acrobat, a software suite with utility not just at the point of printing but throughout the cycle of document creation, use and distribution.

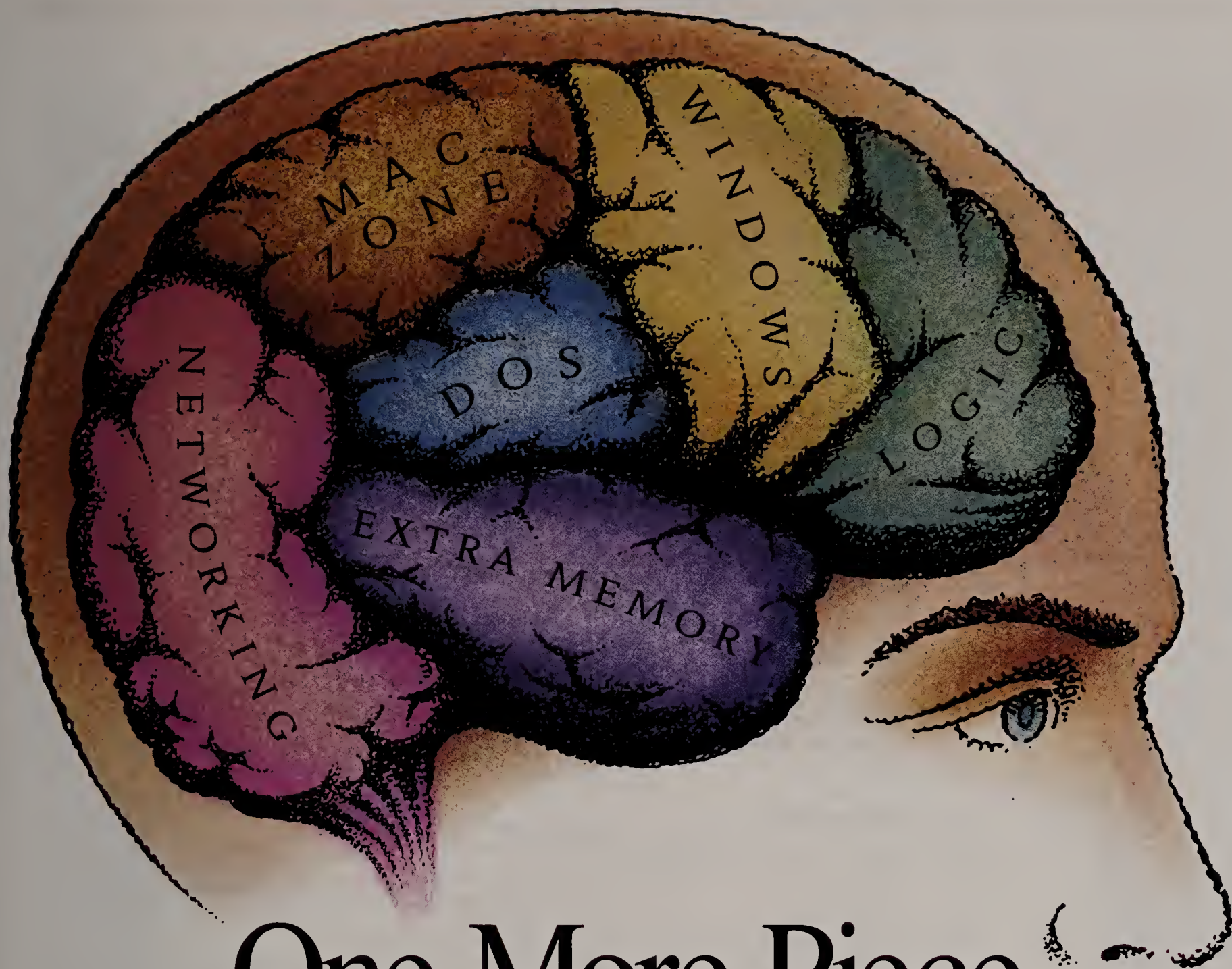
Whereas PostScript originally resided within the printer's firmware, Acrobat in effect makes PostScript nomadic, in the form of its Portable Document Format. This means the description and duplication of document formats are device- and application-independent. Acrobat, acting as translator, thus preserves the appearance of virtually any document, no matter what software created it. So, business documents can be distributed across diverse platforms without compromising content.

Last tax season, for example, taxpayers who dialed up CompuServe could use Acrobat software, supplied free of charge over the network, to download whatever official

IRS forms they needed. (The downloaded versions retained the famous earnest-but-ominous typographic look and feel of original IRS forms.) According to Adobe, at least one advertising agency now uses Acrobat to transmit magazine ad materials to printing plants via satellite. The printer converts the transmission to film using an Acrobat Reader module. (This is now being done with black-and-white ads but will eventually be possible in four-color formats.)

Acrobat 2.0, released last month, incorporates powerful search technology that enables documents to be searched by key words and phrases. (The search capability relies on Acrobat's cataloging and indexing features, which are themselves assets in managing document information.) The new release, which comes in a workgroup version, includes programming tools with which users can customize security measures limiting individuals' access to certain documents—and even sensitive portions within accessible documents.

The base price is \$195. Acrobat for Workgroups is available for \$1,595; it includes 10 licenses for Acrobat, one license for Acrobat Distiller, and Acrobat Catalog. Adobe Systems can be reached at 415 961-4400.



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If You Are the CIO of a Fortune 1000 Organization or Hold Equivalent Public Sector Responsibility, Please Read This Letter.

October 15, 1994

RE: Measuring the Return on Investment
from Information Technology

Dear Executive:

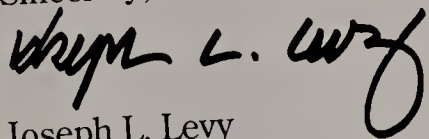
On January 22-24, 1995, *CIO* Magazine and its partners will host the third annual **ROI•T (Return on Investment from Information Technology) Executive Retreat**. The Retreat brings together over 100 corporate, government and business school leaders in information technology and strategy to focus on demonstrating and articulating technology's return on investment.

This program, specifically designed for executives with responsibility for effectively deploying and measuring the value of IT in their organizations, will be chaired by **F. Warren McFarlan**, Senior Associate Dean, Director of Research and Ross Graham Walker Professor of Business Administration at Harvard Business School. He will lead the participants through this two-day immersion in IT metrics and conduct a case study that highlights a technology adoption decision and its consequences to an organization's profitability.

We will also honor the recipients of the third annual **ESPRIT (Excellence in Strategic Partnering for Return from Information Technology)** Awards profiled in the January 15, 1995 issue of *CIO*.

Last January, CIOs from companies such as Procter & Gamble, McGraw-Hill, Federal-Mogul, the US Army, Texas Utilities, Grumman, Xerox, America West, Beneficial Life Insurance and Arrow Electronics were privy to the most innovative thinking in **ROI•T** methodology. Make this January *your* opportunity to join this prestigious roster of IT leaders and learn the latest in applying metrics to IT. Please call us at **800-355-0246** for information about the 1995 Retreat.

Sincerely,



Joseph L. Levy
President & Publisher
CIO Communications, Inc.

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BOOZ-ALLEN & HAMILTON



Data General



Continued from Page 72

sage chairs that no one would have time to use if they were actually engaged in steering their businesses. Chapter II ("He's Not Heavy, He's My CEO") explores this new paradigm and includes several case studies, including a comparison of the old and new leadership styles as evinced by Alan Brady and Rob Petrie, respectively, on the old *Dick Van Dyke Show*. (For my analysis of the contrasting leadership styles presented by Ed Asner in *The Mary Tyler Moore Show* and Lou Grant, see *The Harvard Business Review*, March 1994.)

Middle managers, too, must abandon their dictatorial habits and adopt, instead, the role of coach. Where most business gurus fail in this brave new world of global competition is in helping managers to decide what kind of coaches they want to be. Will you adopt the benign, inspirational model of Ronald Reagan in *Knute Rockne All American*? Or that of the tough yet witty Hayden Fox on the popular ABC sitcom *Coach*? Certainly you will want to avoid imitating Bobby Knight or the intimidating gym instructor with a metal plate in his head from *The Wonder Years*. It's a tough call, and Chapter III ("Leadership and the Gipper") is devoted to helping managers determine the style that is right for them. In making that decision, remember that evolution, not revolution, is key.

No matter what role you choose, you will have to accept the fact that your relationship with the people you manage is going to change radically. While you will not exactly be on their *level*, you will probably be compelled to relate to them in a more-collegial fashion, *persono a persono*, if you will. It may even be advisable to get to know them better: attending their kids' birthday parties, accompanying them on dates and the like. The goal here is to enable, facilitate and delight while never, never reinventing the wheel.

One way to help narrow the gap between managers and non-managers is through title modifications. Many companies, in their

attempt to become more lean, mean, nimble, quick, flexible and above all—*virtual*—are dispensing with the old hierarchical titles and replacing them with a blanket term like "associate." This might be some-

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they can meet the new
challenges.**

thing you will want to try, although I see no problem with calling yourself executive associate or even senior vice associate if the whole idea makes you too uncomfortable.

The flip side of managers devolving responsibility onto employees—what I like to call "dumping"—is the empowerment of those employees—what I like to call "pumping"—so that they can meet the new challenges. One critical way of achieving this goal is through the creation of high-performance teams—which can have as few members as one and as many as 17,000. These teams must be given access to all information within the organization—with the obvious exception of stuff they're better off not knowing—as well as complete autonomy to initiate projects, control their own budgets, deal with customers and suppliers, hire, fire, draw, quarter and pillory. Chapter IV ("I'm Cross-Functional, You're Cross-Functional") offers an in-depth analysis of the care and feeding of teams, including several case studies that appear in other books but in smaller print and with narrower margins.

As mentioned earlier, in companies

that are trying to become more lean, mean, nimble, quick, flexible and above all—*virtual*—pumped employees will need access to lots and lots of information, and therefore a heavy investment in computers is critical to any successful paradigm shift. In this brave new world of global competition, information technology has changed how we live and work in ways most of us never would have imagined possible. Yet even in this area of constant and dramatic change, your approach should be evolutionary, not revolutionary—after all, you don't want to reinvent the wheel.

As a longtime user of IT—and a major stockholder in several high-tech companies whose products figure prominently in the case studies provided in Chapter VI ("Stuff You'd Better Buy")—I can attest to the importance of equipping employees at every level of the organization—from the CEO on down to the guy who wraps sandwiches in the cafeteria—with the state of the art in hardware and software. The goal is to create an information architecture that enables, facilitates, supports and empowers, while avoiding at all costs the temptation to reinvent the wheel. This chapter also explores the best approaches to training users in key applications ("Solitaire," "Mine Sweeper"), important words like open systems and client/server that you should know (although certainly not understand) and how far you can go in E-mail without being brought up on charges.

As more and more reengineering efforts fail in this brave new world of global competition, more and more books like this one will be needed to say, "Aha! Just as I thought!" It is my fervent belief that hindsight, while possibly not as valuable as foresight, can be just as lucrative.

So take all those old ideas, crumple them up and toss them in the toilet. And hey, don't forget to flush. **CIO**

Ezra Poundcake is the former crossword puzzle editor at TV Guide and has many friends who work in companies. My First Business Book was co-authored by CIO Senior Editor Leigh Buchanan.



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My First Business Book

Congratulations! You have just purchased the most important book you will ever read. *My First Business Book* is a radical rethinking of the way companies must operate to succeed in the brave new world of global competition. A truly unique perspective on the current business climate, it eschews those organizational band-wagons onto which so many well-intentioned but misguided organizations have recently jumped.*

The opportunities for companies that manage to be lean, mean, nimble, quick, flexible and above all—*virtual*—float tantalizingly above the horizon like the spires of the land of Oz. But the Yellow Brick Road can be perilous, and difficulties ranging from tight budgets to employee resistance lurk just behind the next tree like the Wicked Witch of the West, waiting to throw a fireball at your change efforts. Companies striving to weave quality into the very fabric of their organizations are in fact managing only to reinvent the wheel. As Geena Davis warns in the 1986 remake of *The Fly*: “Be afraid. Be very afraid.”

So how do you avoid these pitfalls and become more lean, mean, nimble, quick, flexible and above all—*virtual*? The answer is right there in front of you, passing cash across the counter, negotiating on the other end of the phone or signing for a delivery on a loading dock. Yes, it's the customer, stupid. And Chapter I (“The Customer's

Stop the presses!
Toss out those old
management tomes.
You're about to be
introduced to the
one true word in
business
management
thought.

BY EZRA POUNDCAKE

Skin: Getting Under It and Staying There”) is devoted to the critical goal of becoming a customer-focused company. “The customer is always right” is more than just an old saying: It's an adage! And if you hope to succeed in the brave new world of global competition, you had better be ready to do what it takes to keep that customer happy—even if that means locking your company's doors and windows at 4:55 p.m. to make sure that no one leaves before an order is ready. The secret is in evolution, not revolution. After all, you don't want to reinvent the wheel.

It is conventional wisdom that leaders of these newly customer-focused companies, companies that are striving to become more lean, mean, nimble, quick, flexible and above all—*virtual*—must trade in their old, autocratic style for a gentler, more-hands-off approach. Some naysayers continue to doubt the efficacy of this strategy, but the fact that it works for most

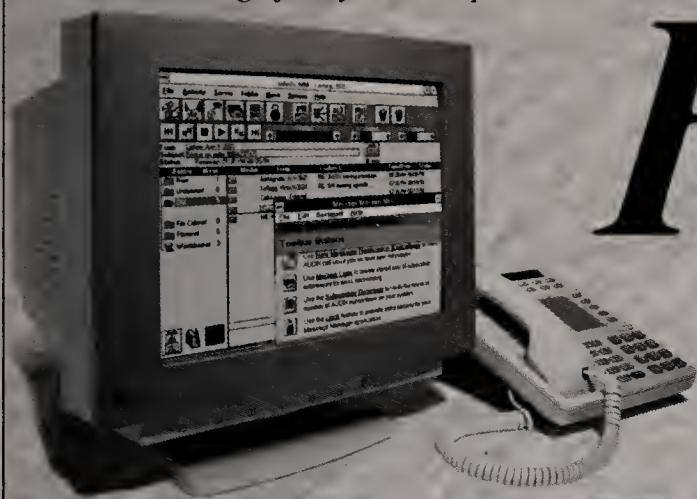
is proved by the success of The Sharper Image and other companies that sell electronic gadgets, pinball machines and fancy mas-

Continued on Page 70

**except for empowerment, team-based structures, re-engineering, process-based organizations, coaching, new leadership models, flattened organizations, virtual corporations, work as conversation, universal information access, total quality management, learning organizations and anything having to do with paradigms or shifts*



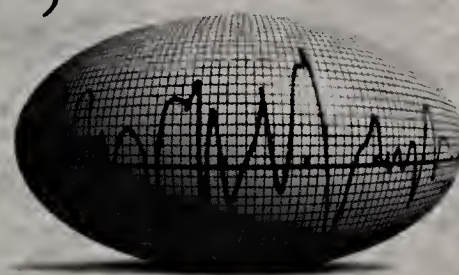
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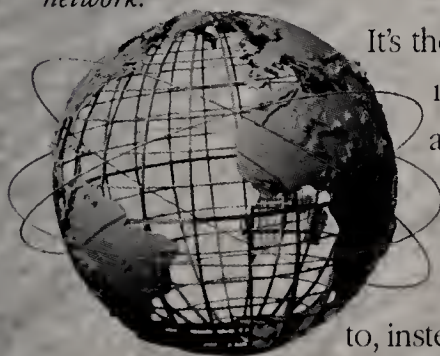
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